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COMPUTERWORLD

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IBM makes its pitch for customers who don't want the Micro Channel bus. Page 129.

Kendall's MIS creed is 'change,' which should make it well-prepared to deal with Colgate-Palmolive's decision last week to sell the company. Page 95.

Sold! CA gets ADR for $170M

BY CLINTON WILDER
CW STAFF

GARDEN CITY, N.Y. — Reaching the billion-dollar revenue plateau with a major leap into the database management systems market, Computer Associates International, Inc. last week agreed to acquire Applied Data Research, Inc. from Ameritech for $170 million.

The acquisition will lengthen CA's lead as the largest independent software supplier. CA, which attempted an unsuccessful $191 million buyout of Management Science America, Inc. just two months ago, has turned the nine-figure software industry megadeal into an annual occurrence. CA shocked the industry last year with the $800 million buyout of its biggest competitor, Uccel Corp.

"It's just another milestone in the road," CA Chairman Charles B. Wang said of the billion-dollar revenue mark, which CA will reach in fiscal 1989, based on combined projected revenue of CA and ADR. "We have not yet defined where nirvana is. You set goals, you meet them and then you set new goalposts."

Some ADR customers, however, were less than thrilled with the new ownership. Although ADR has been owned by Chica-

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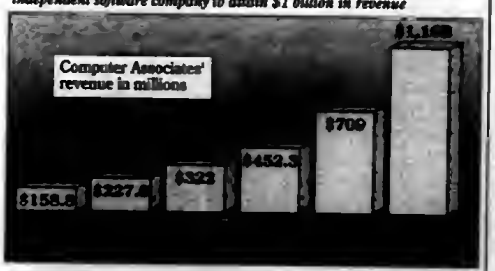
Exclusive membership

Computer Associates' acquisition of ADR should help CA become the first independent software company to attain $1 billion in revenue



CW CHART

Docs swallow PC medicine

BY J. A. SAVAGE
CW STAFF

VICTORIA, B.C. — Doctors in British Columbia, like doctors everywhere, would like to attend to delivering babies, dressing wounds from runaway chainsaws and the like. The furthest thing from their minds is figuring out what to do with a hard disk, a keyboard and a modem.

But in this Canadian province, they don't have that choice. The Ministry of Health is telling doctors to computerize by April 1989 or risk their paychecks.

The government figures to save at least $2.6 million per year by trimming 117 data entry jobs when the system goes into effect. But some doctors will be dragged into the computer age kicking and screaming.

"You can appreciate a lot of anger initially. The doctors

Continued on page 15

It costs *how* much?

BY JAMES CONNOLLY
CW STAFF

So, the home PC is near capacity and now might be a good time to drop a mainframe into the basement to handle that moonlighting business. How much could it cost?

The mainframe itself — say, an IBM Enterprise System/3090 Model 200S — only runs about $5 million. But by the time the average buyer gets a data center up and running for a year, the costs can reach perhaps $23,789,535, plus several million dollars to pay the electric bill, the water bill and the staff to run a mega-home computer.

To be realistic, even dedicated hackers don't set up personal mainframes, and few corporations build data centers without having an installed base of systems and software. But rookie data center planners might be surprised by the cost of a data center for an imaginary distributor in New Jersey. *Computerworld* priced such a project by interviewing consultants and architects and by obtaining prices from vendor product announcements as well as the local business supplies catalog.

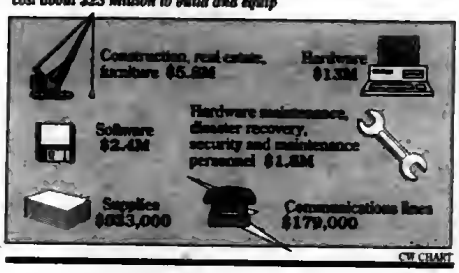
Surprises can include the following:

- The 10% or greater impact of

Continued on page 127

Starting from scratch

A data center capable of supporting 800 terminals and PCs would cost about $23 million to build and equip



CW CHART

Cloners hop off IBM bus

Group seeks to stymie Micro Channel appeal

BY DOUGLAS BARNEY
CW STAFF

NEW YORK — If it were a typical playground brawl, IBM would have been easily pummeled by the 80 companies that convened last week to cripple its influence on the PC business. But the war over bus architectures, which pits the nearly solitary IBM with its Micro Channel Architecture against the many with an alternative 32-bit proposal, is anything but typical.

Sighting a chink in IBM's armor — slow sales of its Micro Channel systems — competitors last week announced the Extended Industry Standard Architecture.

Rounded up by Compaq Computer Corp. and reading like a Who's Who of PC-compatible makers and third parties, the group will create an advanced 32-bit bus that all clone makers will be able to license. EISA may also let cloners ignore IBM demands for royalties of up to 5% for cloning the Micro Channel.

Superiority complex

Because EISA boasts the same central features as the IBM bus, the announcement appears to be an admission that the MCA is technically superior to today's Personal Computer AT bus. That marks a dramatic reversal of previous arguments by IBM's rivals that the AT architecture IBM largely abandoned was sufficient for user needs.

A better bus is essential to handle new, higher speed peripherals. "Over time, as new classes of productivity, communications, database and transaction processing applications are laid upon one another, today's bus will become overloaded," Compaq Chairman Rod Canion said.

While the proposed bus will act a lot like the MCA — for instance, it will be able to use multiple processors — it adds compatibility with the bulk of today's

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Seven-layer cake. IBM's upcoming communications products, some formerly exclusive to Europe, will extend support to all seven OSI layers. Page 8.

CPU wallflowers. NAS' 15 new mainframe models unify earlier AS/XL, AS/VL lines but have few features to distinguish them from the crowd. Page 128.

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4 DEC systems integration, support formalized with net management blueprint.

4 DRAM shortage strikes again: Macintosh prices take a hike.

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6 SQL Server Network Developer's Server should be here next month.

8 IBM adds models to buoy 9370 line; experts say it'll take more to float that boat.

8 Death knells for IBM's 4381.

10 Unisys mainframes will now speak Sperry and Burroughs languages in prelude to architecture merge.

10 Proteon provides graphical net management system.

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Quotable

"When they invited me to Torrance, my lawyer advised me not to go."

C. WAYNE RATLIFF
DBASE CREATOR

On learning that Ashton-Tate wanted to give him an award. See story page 6.

NEWS

Serious reservations

GAO fears excess profits for Sabre, Apollo systems

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The Sabre and Apollo airline reservation systems are making excessive profits and need more stringent regulation by the federal government to prevent anticompetitive abuses, the U.S. General Accounting Office (GAO) told Congress last week.

Sabre is a computerized reservation system (CRS) run by American Airlines; the Apollo CRS is owned by United Airlines and several other carriers. Together, these systems represent 75% of the CRS market.

The GAO said possible regulatory moves by the U.S. Department of Transportation (DOT) could include divesting or forming a single industry CRS along with cutting the high booking fees charged other airlines.

At a hearing held by the House Subcommittee on Aviation, DOT officials said they are reluctant to take such steps because the CRS industry is so complex and each of the regulatory proposals has flaws. The DOT officials said they prefer to act on complaints about specific abuses.

Rich rewards

American and United have repeatedly testified in the past that the high profits are just rewards for their investments in developing the systems.

Focusing on the highly profitable booking fees, the GAO concluded that they "reduce competition in the air passenger market because they artificially raise the costs of participating carriers."

The GAO based its conclusions on a recent DOT study that revealed the high profits of Sabre and Apollo and on the fact that their owners charge booking fees roughly twice the cost of providing the service [CW, June 13].

Profit reports

The DOT report estimated that Sabre made a profit of $178.1 million in 1986, a 76% rate of return on investment. Likewise, Apollo made a $136.5 million profit, achieving a 52% rate of return on investment.

In another development last week, a federal judge in Los Angeles dismissed price-fixing charges against Sabre and Apollo. U.S. District Judge Edward Rafeedie said the plaintiffs had not demonstrated any conspiracy to fix the prices of booking and ticketing fees charged to other airlines.

Although the ruling narrowed the scope of the suit filed by 12 competing airlines, still to come is a trial on the remaining charge that American and United have monopolized the CRS market [CW, Aug. 22].

Airline hurt by faulty fare estimations

BY JEAN S. BOZMAN
CW STAFF

DALLAS — American Airlines' summer software enhancement prevented it from doing what it does best: selling lots of airplane seats.

The Sabre system's yield-management system, enhanced in June, failed to show the correct number of discounted fares available for reservations this summer. The flawed software cost the company about $50 million in lost revenue, American Airlines Chairman and Chief Executive Officer Robert L. Crandall told New York stock analysts Sept. 8.

Travel agents querying the Sabre system ended up recommending that passengers seek discounted fares on other airlines, American Airlines spokesman Al Becker said. "There was some flaw in the logic of the software," he explained last week. "When the program came on-line in June, it had the result of prematurely closing out certain categories of discount fares."

The company discovered the mistake only after reviewing lower-than-expected passenger statistics this past summer. By then, the flawed software had been on the job for nearly 60 days, during the year's peak travel period.

Now that the problem has been recognized, American will probably require more rigorous testing of software changes, Becker said. "We gave away $50 million in revenue that we should have carried for American," he said. "We're convinced that if we had done more thorough testing, we would have discovered the problem before the new software was ever brought on-line."

EDITOR'S NOTE

The worksheet on page 80 of last week's *Computerworld Premier 100* supplement contained errors. A corrected version appears on page 128 in this issue.

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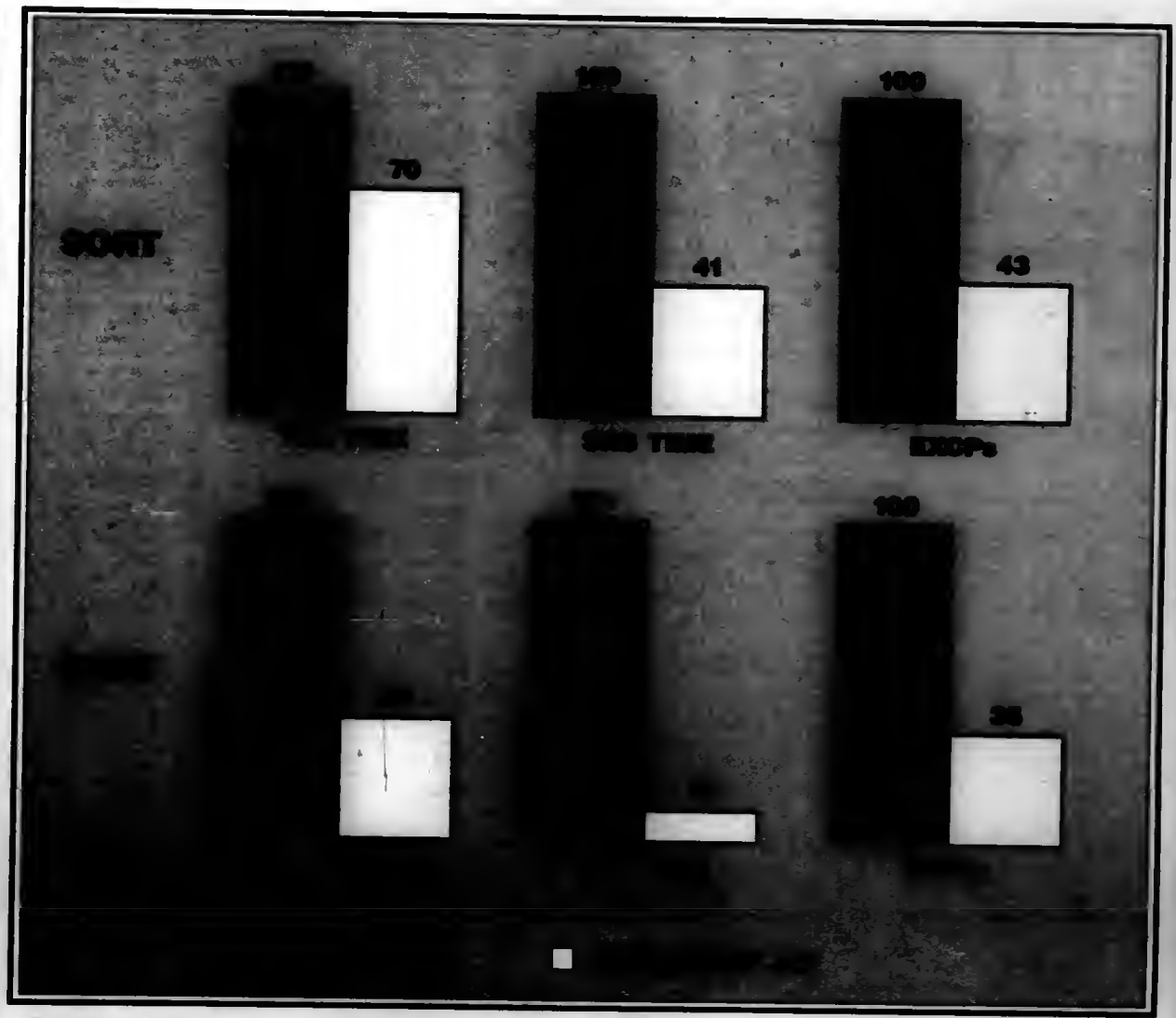

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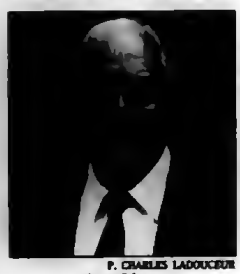
Olsen: DEC to offer RISC Unix machine

BY AMIEL KORNEL
IDG NEWS SERVICE

CANNES, France — Stopping short of making a product announcement, Digital Equipment Corp. President Ken Olsen confirmed here last week that his company plans to offer a Unix workstation based on reduced



P. CHARLES LADOUCEUR
Ken Olsen

instruction set computing (RISC), a design reported to be radically different from DEC's current VAX architecture.

"We're putting a lot of effort in RISC Unix workstations," Olsen said. "There is a good likelihood we'll offer VMS on the VAX and Unix-type software on some other kind of machine. That comes very close to making the announcement I don't want to make."

Olsen also said that by the end of the year, DEC will release a widely rumored desktop computer, code-named PVAX, designed to run VMS and Microsoft Corp. MS-DOS applications concurrently. Olsen spoke at Decworld '88, the annual exhibition and symposium hosted by DEC for its worldwide clients.

Speculation about DEC's workstation strategy dominated the discussions. Many visitors at the exhibition center expected to see the firstfruits of DEC's 9-month-old agreement with Apple Computer, Inc. DEC has also signed limited agreements with Italy's Ing. C. Olivetti & Co., Compaq Computer Corp., Zenith Data Systems and others to assure interconnect possibilities between those firms' personal computers and VAXs. However, DEC did not present new products resulting from those alliances at Decworld. Visitors were also disappointed by the absence of PVAX.

Real-time-oriented

However, one major European user said he and other DEC clients were briefly shown a prototype of the machine in a room near the main exhibition area. He described the system as a Microvax 2000 connected to an Intel Corp. 80286 or 80386 coprocessor over a specially developed DEC-made bus. He speculated that the product would be geared toward applications that require data acquisition and processing in real time.

In what was perhaps his strongest statement yet in support of Unix, Olsen said it is clear that a Unix machine is optimal for many workstation applications.

At times, Olsen seemed to be hedging his support for the Open Software Foundation (OSF), the Unix organization recently cofounded by DEC and other major vendors. While expressing support for OSF's goal of promoting applications portability by offering a standard Unix-based operating system, he clouded the issue by saying that "VMS is more OSF-compatible than anything else in the world today and probably will be for a long time."

DEC plugs integration

Enterprise Management strategy unfolds

BY ELISABETH HORWITT
CW STAFF

Seeking to further leverage its networking and service strengths, Digital Equipment Corp. last week announced its formal entry into the systems integration and support arena. The company also announced Enterprise Management Architecture [CW, Sept. 12], a network management blueprint that includes published interfaces for other vendors to tie into the system, DEC spokesmen said.

With Enterprise Services, DEC has taken its existing service portfolio and focused it on the issues of systems integration, while offering to "take more responsibility for project and facilities management," said Jeff Kaplan, a director at the Ledgeway Group in Lexington, Mass.

The vendor does not plan to restructure its existing service and support staffs, although it has "beefed them up" in order to provide Enterprise Services, DEC spokesman Jon Caputo said.

The absence of a separate Enterprise division, or SWAT team, may make it harder for DEC to coordinate delivery of the service, Kaplan said. However, he emphasized that DEC's existing service team is a strong one, accounting for 30% of the vendor's revenue. In contrast, service only makes up about 20% of IBM's revenue, he said.

The two components of Enterprise Services are Enterprise Planning and Design Services, a consulting service; and Integrated Support Services, which can provide ongoing maintenance and facilities management.

Enterprise Services "won't be just DEC employees and products," Caputo emphasized. The vendor has already worked on projects with a variety of software houses and systems integrators and plans to formalize its agreements with those companies, he added.

As part of its strategy to provide multivendor, corporatewide computing and networking, DEC announced last week its Enterprise Management Architecture (EMA), a network management design based on the Open Systems Interconnect standard. The vendor said that next March, it will publish specifications for an interface that will permit third-party vendors to participate in an EMA network management system.

Last week, seven networking vendors announced individual agreements with DEC to design access modules that will allow their networking equipment to be managed through EMA. "We had to concentrate initially on providing bandwidth management," DEC spokesman Anthony Viola said.

The companies are Codex Corp., Digital Communications Associates, Inc., Siemens AG, Stratacom, Inc., Unisys Corp. subsidiary Timeplex, Inc., TSB International, Inc. and Vitalink Communications Corp. Except for Siemens and Vitalink, all support IBM's Netview/PC.

DEC also plans to provide interfaces to systems from vendors that it feels are strategically important to its Enterprise offerings, Viola said. For example, DEC is working with an undisclosed third party — probably Cincom Systems, Inc., according to industry sources — to interface IBM systems with EMA.

Apple raises prices, blames DRAM shortage

BY JULIE PITTA
CW STAFF

CUPERTINO, Calif. — Apple Computer, Inc. raised prices last week on certain models of its Macintosh and peripherals, blaming the increase on the scarcity of memory components.

Industry analysts said the severity of the increases may impact Apple's sales.

The Macintosh II, based on the Motorola, Inc. 68030 microprocessor, suffered the heftiest price increase, rising from $3,769 to $4,869 for a standard model.

The price of a standard Mac SE, Apple's 68000-based system, has been raised to $3,169 from $2,769. Apple's Macintosh Plus, however, remains priced at $1,799.

On the Apple II line, only pricing for the Apple IIGS has been affected. The price of the machine has been bumped to $1,149 from a previous $999.

Not the first one

Many PC manufacturers have already raised prices because of the scarcity of dynamic random-access memory (DRAM) chips, and some have subsequently decreased prices as the shortage of memory components — and their prices — have become less severe.

However, last week's action represents the first time Apple has adjusted prices because of DRAM supply problems.

An Apple spokeswoman said the shortage, combined with four consecutive quarters of 50% growth, has forced the company to raise prices.

"In the beginning, we said we were fortunate because of our long-term partnerships with component sources," she explained. "We share our business plan so that they know what our demands will be.

"But demand has been so strong that we've had to expand the number of vendors that we source from, and we've even had to go to the spot market for DRAM," she added.

Apple projects that shortages will continue through the middle of next year.

Industry watchers said Apple's sales may suffer because of the price increases.

"I don't think they can get away with it," said Bill Lempesis, an analyst at Dataquest, Inc. "The Mac II was high-priced to begin with."

Lempesis questioned whether component shortages forced the adjustments.

"If you look at the different models, the increases aren't equitable," he said. "I find it hard to believe that it's strictly DRAM-motivated."

Apple may be trying to steer customers toward certain systems, increase gross margins or reposition its line in light of expected Mac introductions, he added.

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NEWS SHORTS

IBM looks into 3-D

Silicon Graphics, Inc. last week said that IBM will purchase its Iris Graphics for three-dimensional graphics and license its Iris Graphics Library, an applications programming interface. Terms of the agreement were not disclosed. The move is likely to increase the competition in the market for workstations with 3-D graphics capabilities, a niche that Silicon Graphics pioneered. The agreement is an indication of IBM's interest in that market, Silicon Graphics President Edward R. McCracken said, adding that others are likely to follow.

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More fodder for Bush

Who complains about a computer snafu when the goof means you get a fatter tax refund than expected? Well, one woman who was afraid that keeping the check would lead to a full-scale audit called — but it seems plenty of other people quietly stroll to the bank.

The Rhode Island woman, who works in Massachusetts, actually was just one of the numerous taxpayers to report errors in their Massachusetts income tax refunds recently and voluntarily return their overpaid check. A batch of refunds slipped through the Massachusetts Department of Revenue systems without undergoing post-audit examination in July, the department admitted. The department said the total amount of money involved is likely to be about $1 million and that recovery efforts are underway.

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Stellar strips down

Stellar Computer, Inc. last week introduced a stripped-down version of its graphics supercomputer that will be offered to users who do not require either real-time graphics capabilities or heavy user interaction. The GS1000, scheduled to ship by year's end, will have a starting price of $95,000, according to the company. In March, Stellar introduced its first product based on that power-graphics approach, the GS1000 graphics superworkstation. The company claims to have shipped 50 systems since that time.

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What's in a name?

Pacific Telesis Group has lost a round in its trademark fight over the word "telesis" used in the name of a small Southern California-based consulting firm. A Los Angeles federal judge recently denied the regional holding company's bid for a preliminary injunction against International Telesis Group. Pacific Telesis has said it will continue to press its case.

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Errico finds sugar daddy

Computer-aided software engineering start-up Errico Technologies, Inc. last week inked a deal providing Sunnyvale, Calif.-based mainframe software player Boole & Babbage, Inc. exclusive worldwide distribution rights to Errico's AMS/Team, which is said to feature reverse-engineering capabilities.

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Bell Atlantic to hook LANs

Bell Atlantic Corp. said it will test a metropolitan-area network, or MAN, for high-speed data communications next year in Philadelphia with an undisclosed business customer. The MAN, which connects local-area networks that are separated by several miles, will use fiber-optic cables and transmit at 45M bit/sec. The switched broadband network was developed by QPSX Communications, Inc., a Reston, Va.-based subsidiary of an Australian firm called QPSX Communications Pty. Ltd. that has been a pioneer in MAN technology.

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Bell gateways spread south

Southwestern Bell Corp. announced it will begin trials of a gateway for information services in Houston beginning in March. The one-year trial will allow users with personal computers or simple videotex terminals from Houston-based U.S. Videotel, Inc. to dial a single access number to reach a menu of information services.

Ashton-Tate airs Dbase plans

BY STEPHEN JONES
CW STAFF

CENTURY CITY, Calif. — Ashton-Tate Corp. tried to cozy up to disenchanted developers at a conference here last week by announcing its first Dbase language compilers and outlining a long-term plan to jump-start the Dbase programming language.

The company also said that Dbase IV, its long-awaited Dbase upgrade, is on schedule for shipment by Sept. 30. However, executives said there is a chance of further delays if Ashton-Tate gets last-minute development snags.

Ashton-Tate served up its own version of *glasnost* here in an unexpected departure from its haughty reputation. Not only were past business decisions acknowledged as damaging mistakes and one-time heroes rehabilitated from exile, but open arms were extended to a development community that is more accustomed to the cold shoulder.

Lonely users?

The absence of a compiler and nearly three years without a Dbase upgrade has resulted in power-hungry corporate and independent users feeling neglected. Many swapped Dbase for speedier clone tools developed by rival companies such as Nantucket Corp. and Fox Software, Inc.

With its market share being steadily swallowed by clone makers and the threat of future competition from the likes of IBM and Oracle Corp., Ashton-Tate is scrambling to win back the legion of Dbase defectors.

"We didn't listen to the development community as intently as we should have, we didn't court them and we didn't bring out a compiler to meet their needs," said Ed Esber, chairman of Ashton-Tate. "We were wrong, and we admit it."

The Step IVward code converter is aimed at winning back Dbase developers with programs written with such tools as Nantucket's Clipper or Fox's Foxbase. The $89.95 converter utility, set to be available in the fourth quarter, is designed to reduce the time needed to recode a clone application into executable Dbase IV code.

Many developers seemed elated by the announcements and said they are willing to give Ashton-Tate another chance.

William Ossler, project manager for corporate information systems at GATX Corp. in Chicago, uses Dbase but relies heavily on Clipper as an application generator. He said he will move completely back to Dbase if the code converter and compiler live up to Ashton-Tate's claims.

"I'm optimistic about both products, but I'm not going to burn any bridges by converting my Clipper files until I'm sure they work," Ossler said.

Dennis Gilman, acting chief of information planning for the Army Corps of Engineers in Little Rock, Ark., said the code converter would help users like himself, who run both Dbase and Clipper, warm up to Dbase IV.

"You're not going to get anybody to move over their clone applications if it means doing it by hand," Gilman said.

Dbase Professional Compiler is the high-performance native-code Dbase compiler that users have demanded so strongly. In the past, Ashton-Tate shunned such a tool for fear it would cannibalize core Dbase sales.

> "WE DIDN'T listen to the development community as intently as we should have. . . . We were wrong, and we admit it."
>
> ED ESBER
> ASHTON-TATE

The development tool will be available with the Developers Edition of Dbase IV Version 1.1, which will contain hooks to tie into SQL Server. The 1.1 Developers Edition is scheduled to ship in the first quarter of 1989 for $1,295.

The Dbase IV 1.0 Developers Edition will ship with the product by the end of this month for the same price, the vendor said.

Questions were raised about whether Dbase IV will meet its already delayed Sept. 30 deadline and what will be in the first version.

Several users of recently released Dbase IV beta code said the program is too rough to ship by the end of the month. "It isn't ready for shipment," said David Kalman, editor of "Data Based Advisor" in San Diego, an evaluator of Dbase IV.

But Ashton-Tate's Esber maintained that the product, complete with full SQL implementation, is in its final stage of testing. With nearly 300,000 Dbase IV copies expected to be released in the first wave of shipping, Esber said Ashton-Tate cannot afford to sell a problematic program.

Peace signs

The biggest surprise was the offering of the olive branch to C. Wayne Ratliff, the father of Dbase. Ratliff fell out of favor with Ashton-Tate — and into a lawsuit that was recently settled out of court — when he quit three years ago to start his own rival development firm.

Ratliff said he was surprised two weeks ago when Ashton-Tate called him to its Torrance, Calif., headquarters — for the first time in more than two years — to tell him he would receive an award here for "Excellence in Software Development."

Reflecting on his visit to Ashton-Tate, Ratliff echoed the same reluctance expressed by users who are not sure what to make of the company's user-friendly efforts. "When they invited me to Torrance, my lawyer advised me not to go," Ratliff said.

SQL Server coming

Developers waiting to get a crack at the much-touted open architecture of the SQL Server database engine will get their chance next month.

Ashton-Tate announced last week that it and Microsoft Corp. will ship the SQL Server Network Developer's Server in October at a price of $1,195. Ashton-Tate, Microsoft and Sybase, Inc. are current developers of SQL Server.

The kit is chock-full of development tools, including full code for SQL Server, Microsoft's OS/2 LAN Manager, documentation and application programming interface (API) libraries. The API libraries, when used with Microsoft's C compiler, can create applications under MS-DOS, Microsoft Windows or OS/2 that can run with SQL Server.

Although SQL Server's three developers have bragged that the technology of the database engine will be open to anyone, developers have not been able to see any of the needed code since the product's announcement in January.

Ed Esber, chairman of Ashton-Tate, said developers have enough time to get started on applications work because SQL Server will not ship until the end of this year.

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New hue for 9370

Some doubt upgrade will challenge mid-range

BY ROSEMARY HAMILTON
CW STAFF

The IBM 9370 series got a whole new look last week, but observers said it is still not enough to make the low-end 370 line a serious mid-range offering.

IBM rolled out three machines, the Models 30, 50 and 80, to fill gaps in what had been a four-model product line. The machines will begin shipping at the end of the month, according to IBM.

Existing models, excluding the high-end Model 90, received price cuts of an average of 30%. Along with the new systems came several software enhancements, including two operating system releases.

"This is just another tweak," said Frank Gens, a vice-president at International Data Corp.'s Financial Services Corp. in Framingham, Mass. "It won't remedy everything. The 9370 picture is not going to change overnight."

But beyond the new products are several aspects to this announcement that show how committed IBM is to the 9370, asserted Ed Kfoury, president of the company's systems products division, in an interview with *Computerworld*.

IBM renamed the product line, which has been the 9370 Information System, to Enterprise System/9370 to designate it as a more strategic product. With the introduction of the 3090 S models last summer, IBM renamed its high-end mainframes the ES/3090s as well.

Secondly, Kfoury said last week's announcement will be followed by several other hardware announcements. "We will see ESA versions; we will see bigger machines and smaller machines as we go."

Thirdly, two of the new models use CMOS technology, a first for a 370 mainframe product. "We're making technological investments in this product — and those are the ones that cost us," Kfoury said.

Hanging around

"It is important that people understand that this is a product that will be with us for some time to come," Kfoury added.

Nonetheless, observers said IBM has several other areas to address before the product line can be a serious threat to other mid-range contenders.

"It needs more horsepower, more SNA functionality, and the VM/XA operating system is still missing," said Gibbs Moody, a senior technology analyst at Hambrecht & Quist, Inc. in San Francisco. "The announcement is a small step for IBM, and hopefully, bigger steps will follow."

Even though IBM cut prices on existing models, consultants said it needs to chop prices more for the system to sway users from competitive offerings.

"They really need an entry price that shocks the market," Gens said. "The 9370 needs a real jolt. They should take it down another 10% to 15%."

For now, newcomers will find an entry price of $25,000 with the Model 20. Kfoury considers it a strong entry-level model, not only because of price but because users can now upgrade from the Model 20 to the Model 30.

One system that may soon be phased out, however, is the Model 40, Kfoury said. The Model 50 offers double the performance of the Model 40 and will cost $70,000. Before last week's price change, the Model 40 cost $68,250. It will now sell for $55,000.

On price alone, the Model 50 will also be challenging the older Model 60, which will cost only $2,000 more than the Model 50. An IBM spokesman said the Model 60 will be aimed at the scientific market to distinguish it from the Model 50.

The Model 90 remains the top-of-the-line system, with an unchanged price of $199,500.

Larry Ford was quietly reassigned this past summer to become head of IBM's internal information systems. As assistant group executive of mid-range systems, he served as public spokesman for the AS/400 and lackluster 9370 lines. A spokesman said Ford is now effectively CIO of IBM.

And what of the 4381?

Are the IBM 4381's days numbered? Several signs point that way.

Under a 4381 Technology Exchange Option included in IBM customer letters last week, a 4381 customer using a new 4381 processor under an IBM Credit Corp. lease may exchange the system but only for "a different machine type of equivalent or greater performance as defined by IBM."

Currently, only a 3090-class processor would qualify, although the plan could apply to an as-yet unannounced system, an IBM spokesman said. "If you want to lease a 4381 now, you will be protected," the spokesman said. The plan specifies that at least 12 payments on the lease must be made.

"The 4300 line has been around for a long time. Everybody knows it's nearing the end of its life cycle," said Steve Josselyn, an analyst at International Data Corp. The announcement may encourage users to move to 3090s, but it "leaves the door open to upgrade to a box that hasn't been announced yet," he said.

Josselyn said he expects a high-end 4381 to be announced later this year or early next year that will be based on CMOS technology and have a "9370 look and feel."

A Technology Exchange Option announced last year for System/36 and System/38 users presaged this year's rollout of the Application System/400.

STANLEY GIBSON and ROSEMARY HAMILTON

IBM to fill OSI gaps

BY ELISABETH HORWITT
CW STAFF

IBM is expected to release a deluge of communications announcements this week, including offerings that will fill some major gaps in its support of the Open Systems Interconnect (OSI) standard.

IBM will announce U.S. availability for products that until now have only been available in Europe, according to Jeremy Frank, program director of enterprise network strategies at the Gartner Group, Inc.

On another international front, IBM Canada and Toronto firm TSB International, Inc. last week introduced Hubview/PC, a system said to collect traffic statistics, alerts and billing information from a variety of private branch exchanges (PBX), then send the data to IBM's Netview via the Netview/PC interface.

IBM's OSI support until now has been limited to protocols, such as X.25, that define physical connections between systems, Frank said. The new U.S products will expand that support to provide all seven layers of OSI-based networking, including session, transport and presentation. However, several of the announcements will only be statements of direction rather than real products, sources said.

X.400 included

IBM is also expected to announce U.S. products that incorporate X.400, the OSI electronic mail protocol. Frank said the introductions will include gateways to X.400 systems for IBM's Distributed Office Support System, Professional Office System and Document Content Architecture/Document Interchange Architecture.

While IBM representatives assured Gartner Group analysts that the company has no strong objections to using OSI to connect its devices, "the general feeling is that they want SNA for intra-enterprise and OSI for inter-enterprise," Frank added.

The Hubview/PC software announced last week will run on TSB's AT1 device, which sits in front of each PBX and listens for information about developing problems on the switch. "Managers with several different types of PBXs can get real-time alerts" via Netview, TSB president Patrick Montani said.

PBXs initially supported include IBM/Rolm 9751, Northern Telecom, Inc. SL-1, AT&T System 75, as well as PBXs from Mitel, NEC, and Ericsson, Montani said. Hubview/PC is scheduled to be available in December and will be sold by IBM Canada.

Sold!

FROM PAGE 1

go-based regional holding company Ameritech since 1985, users said it had considerable independence and autonomy. In contrast, CA has historically integrated its acquisitions into its organization and culture.

CA is "big, and that's good, but who knows where they're coming from? What are they going to do with Datacom?" said Todd R. Smith, a senior database analyst at Carolina Power & Light Co. in Raleigh, N.C. "Ameritech had money to throw around to support it. At CA, all that money is taken up with other areas right now."

ADR's Datacom/DB will establish CA as a major player in DBMS, a market in which its CA-Universe product has failed to gain much momentum. Datacom/DB had more than 7% of the U.S. DBMS installed base in 1987, compared with less than 1% for Universe, according to Focus Research Systems, Inc. in West Hartford, Conn.

Wang said that, pending merger approval, ADR would be part of a new database and programmer productivity unit within CA's Application Products Division. ADR will retain its Princeton, N.J., headquarters, and Wang stressed that CA will continue to support the entire ADR product line, which competes little with CA offerings.

Analysts hailed the deal as a great one for CA because of the low price, product fit and strong ADR technology. "It's amazing that you could find two companies of their size in this industry that don't overlap at all," said Charles Taylor at Prudential-Bache Securities, Inc.

But customers were skeptical about the apparent synergies. Smith said that Carolina Power & Light's MIS department had already decided to switch from Datacom/DB to IBM's DB2 when it learned ADR could be sold because of uncertainty about the product's future.

Looking ahead

Another customer of both CA and ADR expressed concern about continued attention to future enhancements of ADR products. "With the four CA products we have, we haven't seen new releases even once a year," said Curt Swindoll, MIS director at Insight for Living in Fullerton, Calif., which runs IBM's DOS/VSE. "You just don't get the same professionalism from CA [as ADR]. You're just one of many to them."

Ameritech sold ADR for its book value, which was $45 million less than it paid for the unprofitable software vendor in November 1985. But ADR was "close to profitability" in 1987, according to ADR President Dennis Strigl. Strigl said his future as ADR's chief has not yet been decided.

Nonetheless, CA will take its usual ax to the ADR payroll. Wang said CA is studying a tentative plan that was already in the works at ADR to cut about 20%, or 340 people, from its 1,700-member work force.

"There certainly will be changes," Wang said, but he did not specify which areas were targeted. Laid-off employees would be notified a few days after the merger transaction is completed, he said.

CA's systems software competitors chose to downplay the impact of a billion-dollar software player. "They will have a challenge to digest that acquisition in the short term, and there will be some confusion," said John Crocker, senior vice-president of industry relations at On-Line Software International, Inc.

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Unisys adds 4GLs to A series

BY JEAN S. BOZMAN
CW STAFF

BLUE BELL, Pa. — Two years after the merger of Sperry Corp. and Burroughs Corp. brought two incompatible mainframe lines under one roof, Unisys Corp. has taken the first step to merge the two architectures. Last week, the firm announced that it would provide two fourth-generation languages (4GL), Burroughs' Linc and Sperry's Mapper, on all Unisys A series, 1100 and 2200 mainframes.

Linc and Mapper are also being ported to the company's Unix systems for shipment sometime in 1989. In the next 18 months, the company said it will also provide Linc and Mapper on the former Burroughs V series and on the aging Sperry System 80 computers.

"This announcement makes the convergence-of-architecture argument go away," said Hugo Simpson, vice-president of Unisys Information and Productivity Systems. "You can write your program in Linc or Mapper and not care about whether it's going to run on an A series or an 1100 series — or even some other system down the road — because all [those architectures] have been masked."

The Unisys announcement came just days before the planned introduction of a high-end machine for the Sperry family of mainframes, reportedly called the 2300/600 [CW, Sept. 5]. Industry analysts have said they expect the combination of programming languages from both sides of the house to lead to a merged architecture in three years.

"It's called the 'surround strategy,'" said Dale Kutnick, an independent analyst based in Redding, Conn. "Unisys has found its users moving to other hardware platforms, including other manufacturers' Unix machines."

Exceeding normal definition

Unisys suggests that programmers can use Linc to write systems software, while end users can use Mapper to whittle down applications backlogs. Linc, which generates system and utility code, and Mapper, which generates application code, are both high-level languages that Unisys said exceed the normal definition of 4GL.

According to the vendor, pricing for Linc ranges from $21,700 to $296,000, based on the type of computers supported. Mapper prices range from $7,450 to $110,000. Linc is scheduled for shipment to 1100 and 2200 users in the fourth quarter, while Mapper shipments to A series users are scheduled for the first quarter of 1989.

Proteon offers network manager

BY PATRICIA KEEFE
CW STAFF

WESTBORO, Mass. — Proteon, Inc. introduced a graphical network management system last week that observers said is the first one to provide centralized control for a mix of personal computer networks and wide-area connections.

The Overview system is intended for use with Transmission Control Protocol/Internet Protocol (TCP/IP)-based internetworks.

"Overview is the first implementation I have seen where you can manage multiple PC LANs," said Michael Milliken, a senior network analyst at Boston-based Patricia Seybold's Office Computing Group. "This is a problem that no one else has come to grips with yet."

Although Proteon's network manager will be demonstrated in a multivendor environment during Interop 88, which will be held next week in Santa Clara, Calif., (see story page 55) it is just now going into beta testing. According to Proteon, it is scheduled to ship in 60 days and costs $9,995.

Another key to the token-ring vendor's management software is its support of two Internet standards: Simple Gateway Monitoring Protocol and its predecessor, Simple Network Management Protocol (SNMP), which was approved in March.

Similar capabilities are running on the University of Tennessee's campus network, but Proteon's support may be the first commercial implementation, according to Jeffrey Case, associate director of the school's computer center.

SNMP is important because it provides TCP/IP users with a migration path to Open Systems Interconnect-based systems. It also manages both wide- and local-area networks, supporting monitoring and control functions in a multivendor environment.

Overview reportedly will provide centralised configuration and fault management, enabling network managers to minimise system downtime by detecting and pinpointing system faults and performance problems.

A system configuration table reportedly allows users to change some parameters on the network from the monitoring screen. According to Proteon, other features include an alert log showing critical network-generated events and support for IEEE's 802.3 and Proteon's token-ring, CCITT's X.25, Arpanet and the U.S. Department of Defense's Defense Data Network.

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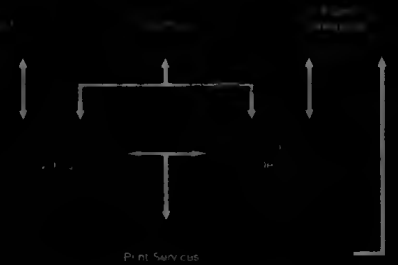

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IBM machine obscures the banking trail

Check-tracking hampered by 3694 software that drops account numbers, overlaps endorsements

BY AMY CORTESE
CW STAFF

Banks using IBM's 3694 proof-and-sort machine have been having troubles lately — since Sept.1, to be exact.

That was when a federal regulation took effect that requires banks to print their endorsements within prescribed zones on the backs of checks.

IBM modified the software on its 3694 machine, but in the process, the firm modified more than many customers would have liked.

The changes have involved dropping a critical piece of information from processed checks and printing other important data over the check endorsement. One user said the problems have added as much as an hour to the day's check-closing process.

Trace elements lost

The problem started when IBM stopped printing checking account numbers on the backs of checks to make room for the designated information zones. Many banks relied on that number to identify an account. Now, users said, bank employees must go to a master tape of transactions and look up the account by sequence number.

But there is a problem with that: The plate that prints the bank's endorsement overlaps the customer's endorsement in many cases. This obscures other critical information, including the number that bank employees depend on to look up the account number from the master tape.

Reactions from 3694 users last week ranged from mild inconvenience to outrage. Some said IBM never told them it intended to remove the account number from the processed checks and that they only learned of the omission when they ran the new software. IBM officials could not be reached for comment.

Jerry Hull, vice-president of operations at First National Bank of Warsaw in Indiana, said that the ability to trace by account number was part of the appeal of the 3694, which costs $55,000.

Obscuring the trail

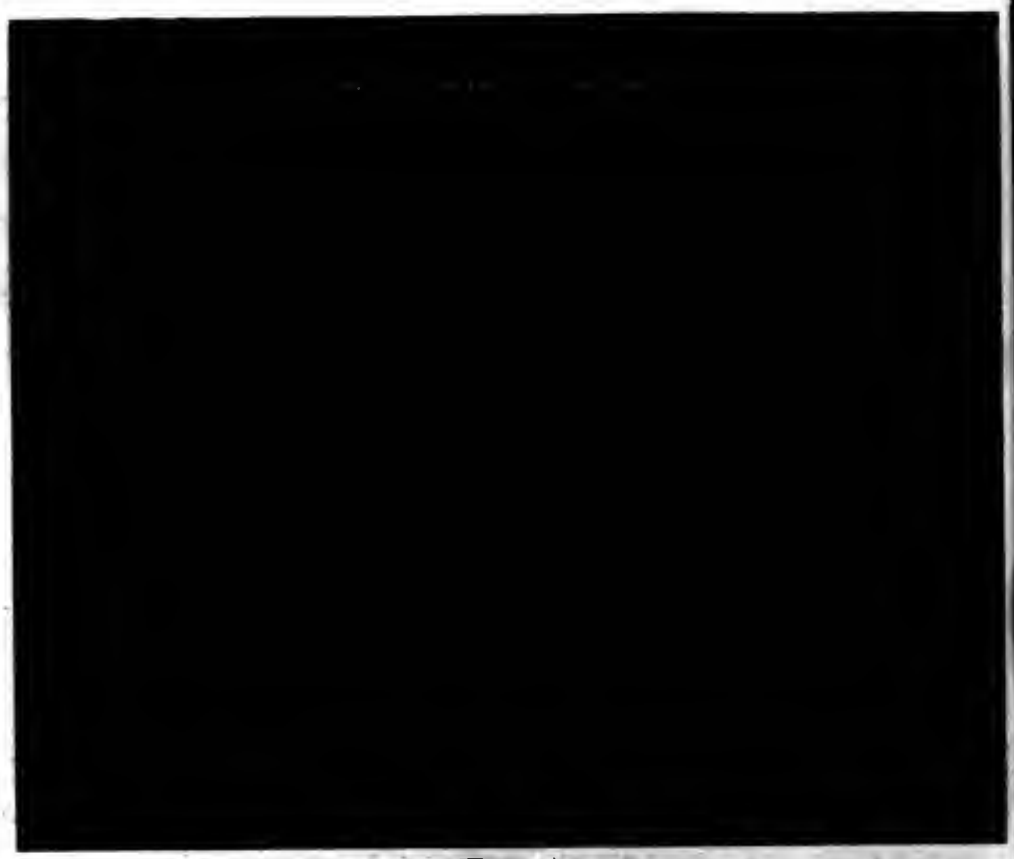
In fact, this feature was a major selling point for many 3694 users. The account number on the back of a check is used as a tracing element for auditing purposes. By taking it away, said Jerry Claunch, vice-president of Citizens National Bank in Somerset, Ky., IBM has eliminated part of the audit trail.

Although he said he is satisfied with IBM's service, Claunch noted that the situation has added an hour to the head teller's workday at his bank. He said IBM has assured him that the situation will be remedied by the first quarter of 1989, possibly in conjunction with the next release of the product.

The federal regulation was passed to cut down the amount of time a bank holds a customer's funds and is a first step in a plan to completely automate the routing of checks.

The regulation mandates that the originating bank's endorsement be printed on the back of a check so that if the check does end up needing to be returned, it can bypass the trail of banks and be sent directly to the originating bank. But if the bank's stamped endorsement is obscured by the 3694, the process can take even longer.

According to one user, the net effect of the complications is that the new procedures are not allowed to work as they were intended.



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Docs

FROM PAGE 1

didn't like having their freedom of choice cut off, especially when it will cost them money," said Ian Gillespie, chairman of the B.C. Medical Association (BCMA) computer committee. The BCMA noted that many doctors may not be able to offset the cost of computerizing.

The initial opposition was fueled by the BCMA, which originally requested that doctors resist signing agreements with computer vendors.

But after negotiating with the government, doctors voted last week to go along with the provincial government's requirement to computerize billing procedures. The provincial health insurance plan is responsible for 95% of doctors' income.

Although it was passed by an 80% majority of the province's 6,000 members, the BCMA referendum showed that many physicians are still uncomfortable with the new procedures.

For its part, the BCMA not only negotiated a better deal for the doctors — with four months more grace time, the option (albeit an expensive one) to continue billing by mail, and a provision forcing the government to shoulder transmission costs — it has also put together computer seminars and continuing education to familiarize members with this medium.

In January, the Ministry of Health notified doctors that it would accept billing only via modem beginning in 1989. In an effort to streamline its offices and cut costs, the ministry decided to dispose of its old card-based system.

The ministry would not specify how much the system will cost the government, but Gillespie estimated an average cost of $4,000 a year for the province's 2,500 office sites, or about $10 million in costs to the doctors.

PCs only

The way the government has set up the system limits doctors to the use of IBM Personal Computer-compatible micros with hard disks and Hayes Microcomputer Products, Inc.-type modems. Apple Computer, Inc. systems may be added in the future, according to John Mullin, director of the ministry's Medical Services Plan.

"We can't tell people what to buy," said Robert Holloway, senior analyst at the Medical Services Plan. But the systems work best with pure IBM machines and Hayes modems, he said.

"It's a catch-22," said David Dyment, a physician member of the BCMA computer committee and a former IBM engineer. "There's no demand for Macintoshes because software developers first want approval from the government, and there's no approval because there's no demand."

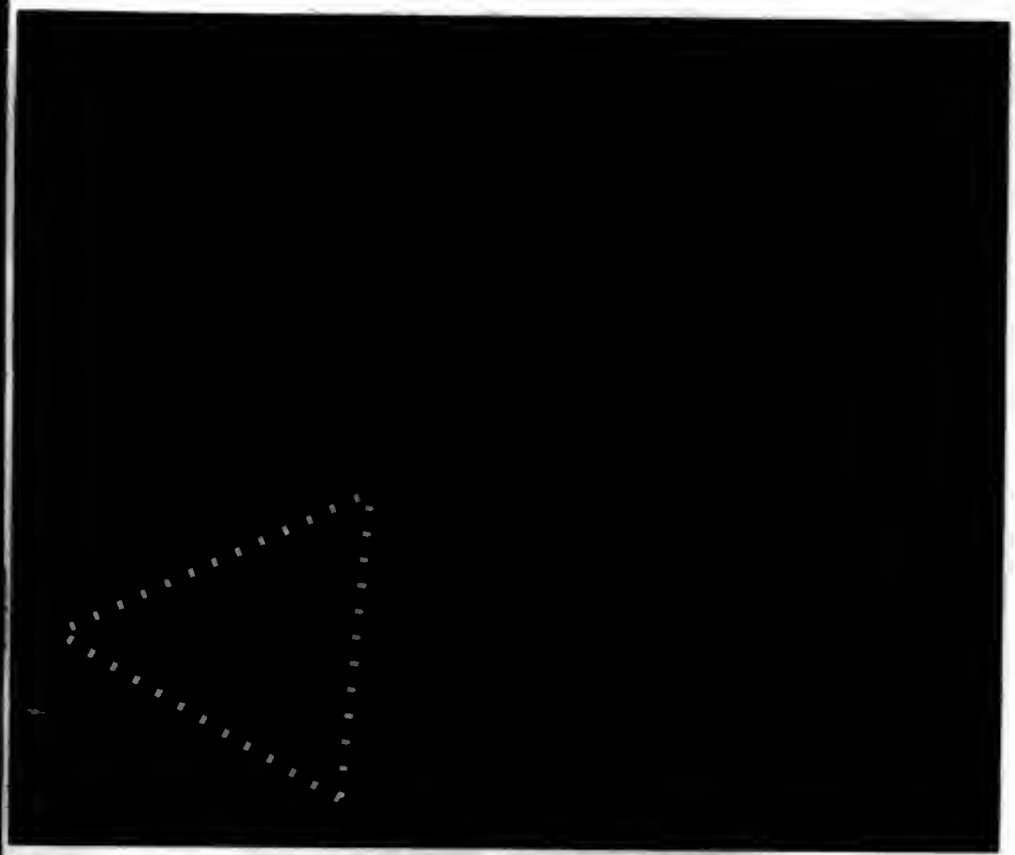
To ease the transition to an automated billing system, the British Columbia Ministry of Health has developed a number of standards and products for use by the province's 2,500 doctor's offices.

The ministry chose a single communications protocol based on Simware, an IBM 3270 emulator developed by Simware, Inc. in Ottawa. It also developed its own shell for Simware, called Teleplan/PC.

In turn, the ministry is contracting with government-owned British Columbia Systems Corp. for time on its two IBM 3090 400Es. The system will not only process the claims but will check a patient's insurance eligibility overnight.

As can be expected, a host of software developers has offered medical billing software to go with Teleplan/PC, most of whom bundle the software and hardware into package deals. Of 25 vendors in an industry medical software group, 14 have been approved by the BCMA.

Once doctors go through the growing pains of computerization, some — like computer enthusiast Dyment — foresee great benefits. Not only will office management become easier, they said, but patient management will become a breeze. "For instance, if a drug is suddenly found to cause a side effect, or a side effect if interacted with another drug, you could use a computer search to find your patients using those drugs," Dyment said.



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Sun fills out IBM connectivity line

BY PATRICIA KEEFE
CW STAFF

MOUNTAIN VIEW, Calif. — Rounding out its suite of IBM connectivity products, Sun Microsystems, Inc. introduced an MVS-compatible version of its Network File System (NFS) standard technology last week.

This latest porting of NFS provides Sun with some heavy ammunition in its bid to expand its reach beyond the borders of the Unix-based engineering workstation market into the IBM-dominated commercial sector. MVS is considered the workhorse mainframe operating system in the Fortune 1,000.

Further bolstering that effort, Sun and The SAS Institute, Inc. are expected to announce next week that SAS statistical analysis and report-writing packages will run on Sun systems.

Jointly developed with Electronic Data Systems Corp. (EDS), MVS/NFS is scheduled to be available in the spring of 1989.

The NFS distributed file system reportedly has more than 250 licensees worldwide and is a component of Sun's overall Open Network Computing environment.

The announcement of MVS/NFS follows IBM's July porting of NFS to the VM environment, rounding out Sun's connectivity support for IBM mainframes. Sun already has a slate of IBM Systems Network Architecture (SNA) products.

"What's new here is direct connection to an IBM mainframe as opposed to having to have a gateway," said Clare Fleig, research director at International Technology Group in Los Altos, Calif.

"NFS is the most dominant system used for linking engineering workstations to Unix computers, and its popularity is moving into the commercial environment," said Joseph Seidler, an analyst at Infonetics, Inc., a market research firm in Santa Clara, Calif.

What is fueling the commercial sector's interest in NFS is the growth in heterogeneous networks, Fleig added.

MVS/NFS is said to make data residing on the mainframe appear local to network users.

MVS/NFS will run in the MVS environment as an application and will not require any modifications to the operating system. Network users have access to information on the mainframe via Sun's high-speed Sunlink channel-attach device.

That is particularly useful for users with IBM mainframes that do not have SNA, Fleig said.

Sun will be licensing MVS/NFS through systems integrators and distributors. EDS, a large systems integrator, said it will offer MVS/NFS to its customer base as well as to General Motors Corp., which is both a client and its parent company.

Major player

MVS/NFS will play a significant role in what GM calls its "C4" strategy, according to Ray Kahn, GM's C4 program manager. He said the new software will enable sophisticated data sharing between strategic applications — such as computer-aided design and manufacturing, computer-aided engineering and computer-integrated manufacturing — running on workstations as well as mainframes.

"This will fuel our drive to establish a corporatewide data pipeline for engineering and manufacturing," Kahn said.

MVS/NFS ties a business' Unix-based engineering, manufacturing and design work groups into a common IBM mainframe database, where they can share data, Fleig said.

Other features of the port are said to include support for system security and system accounting packages.

In addition, MVS/NFS will use Sun's Remote Procedure Call and External Data Representation protocols to develop additional distributed applications among the mainframe and other computers on NFS networks.

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EDITORIAL

Get mad

IF THE CURRENT antics of the personal computer industry leave you dismayed and disgruntled, we sympathize. The hardware vendors are too preoccupied with gamesmanship and too little concerned about serving their customers. To recap:

• April 1987: IBM dumps the PC AT bus in favor of a new, proprietary technology that it claims will open up vast new vistas of computing. Compaq and other leading clone vendors rush in to close the barn door before the cows get out, claiming there is nothing wrong with the existing technology that a little tweaking won't fix.

• September 1988: IBM packages the 80286 processor with — claims of improvements notwithstanding — what is basically a juiced-up AT bus. Compaq, with all the brazenness of a communist historian, proclaims that it has discovered the AT bus can indeed be improved upon; even better, you can keep all those fancy whiziwigs you purchased to use with the older machines. For the record, this month is the anniversary of Compaq's Flex architecture, a scheme to access information stored in cache memory in 32-bit fashion; next month marks the anniversary of AST Research, Inc.'s Smartslot architecture, which was to accommodate both AT- and Micro Channel-type add-on boards.

IBM, for one, deserves a great deal of your ire and scorn. It is so preoccupied with beating back the upstart PC cloners that it forgot the prime directive about the customer always being right. IBM may indeed have some wonderful technology hidden in that Micro Channel Architecture, but it was rushed out before the peripheral products technology existed to enable its use. Of the clone vendors that said they would follow IBM, only Tandy has brought a product to market, as the realization dawned that IBM's strategy, if not quite backfiring, had at least misfired.

So IBM found itself last week in the embarrassing position of reviving the old AT technology it had buried. The company's conflicting goals had made the Micro Channel so difficult to copy and so smothered with hefty royalty fees that the third-party emulators needed to make the technology standard walked away, with many customers following them.

Compaq, too, rates a dressing down. It tried to convince you that upgraded bus technology was not in your best interests; now, when it seems the Micro Channel is slowly gaining a modicum of respect, Compaq is leading a cast of compatible makers in a bid to rewrite the game plan. It expects you to disregard what it said one year ago and buy into a hybrid scheme that sounds great but has a minor catch: The shiny new bus will not roll off the assembly line until late 1989.

It is time these players hammered out a compromise that would best serve their customers. If Micro Channel-type technology is the wave of the future, then give IBM its due and try to work out a more elegant means of achieving it; if IBM wants to ride the crest of the market that comes to the standard-setter, it had better find a way to make the standard attractive enough to follow.

LETTERS TO THE EDITOR

In the same boat

Regarding the article titled "Living in two worlds: A programmer's lament" [CW, July 18], it is really too bad that this poor little programmer feels ostracized by society. Maybe if Dan Woods opened his eyes and looked at other professions he would realize that he is not the only one who feels that way.

I've dealt with programming from both sides, and no one is without sin, be it the user who expects the programmer to know what is needed by osmosis — because the user doesn't know what he wants — or the programmer who thinks he knows all the answers but in reality doesn't even know what the questions are.

Regretfully, the world is filled with a lot of people with various degrees of imperfection, and Woods had better learn that everyone, including himself, has to at times come down to reality.

Al Thibodeau
Carrollton, Texas

The flip side

I too call myself a programmer when asked. But my experience with nonprogramming humans has been the exact opposite of that described by Dan Woods [CW, July 18].

I find the most rewarding part of my job is interacting with end users. I try to put myself in their position to understand their point of view. And they almost always reciprocate by listening to my feedback and suggestions. When I succeed in explaining their alternatives in a mixture of terms they are familiar with — usually, because they've just finished explaining them to me — and the technical ramifications of their request (not necessarily phrased in technical jargon), I find a bond has formed. The user is proud to have understood the technical aspects and feels he is part of the decision-making process — because he has been.

From the other perspective, when I'm with a physician friend and I ask him about a new procedure, I anticipate an answer I can understand. If he starts dwelling on details about body parts I didn't know I had, I'll lose interest as quickly as Woods' nonprogramming acquaintances.

I also enjoy discussing technical issues. When I'm with other programmers, I tend to forget there are others in the group who don't know or care about what we're talking about. That usually means those who are close enough to us to have put up with too many of these conversations.

The point is that it's not necessary to be unappreciated. All it takes is really caring about what the other person's needs are. And that has nothing to do with being a programmer.

Elaine Barlin
President
Madison Avenue Systems, Inc.
Chestnut Ridge, N.Y.

Been done before

John Barnes' column, "A document-first strategy" [CW, July 25], ended with the question: "Is anyone trying this document-first strategy?"

One of the best known, most ambitious and most successful examples of completing the documentation before writing code is IBM's REXX high-level language interpreter, familiar to users of the VM/CMS operating environment and destined to play a prominent role in IBM's Systems Application Architecture strategy.

REXX was developed by M. F. Cowlishaw of the IBM U.K. Scientific Center. In his book, *The REXX Language: A Practical Approach to Programming*, he stated:

"Every major section of the REXX language was documented [and circulated for review] before implementation. The documentation was not in the form of a functional specification but was instead complete reference documentation."

The excellent quality of the REXX languages, its ease of learning and use, its readability and its suitability for a wide range of applications certainly provides no evidence against Barnes' thesis.

John Seefeldt
Director, Bureau of Information Services
Office of the Treasurer, Commonwealth of Pennsylvania
Harrisburg, Pa.

All in favor . . .

Just a line to "second the motion."

I totally agree with Donna Manley's letter [CW, July 4] concerning the generic use of the masculine pronoun.

I enjoy your publication. Keep up the good work.

Louise E. Menser
Programmer/Analyst II
Sacramento, Calif.

Computerworld welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor, Computerworld, P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.

Don't permit change to catch you off guard

JOHN KIRKLEY

Discontinuous change. It's like when you flip a flapjack into the air, and it comes down a fried egg.

It's like when the automakers first began putting the high- and low-beam controls on the steering column. For a while, when evening fell, you automatically stomped the floorboards with your left foot and found nothing there.

It's like when your more technologically advanced users began smuggling early versions of personal computers into the plant, and you still believed that anything smaller than an IBM 370 was a cute toy.

It's like any wrenching, unexpected change that is a deviation from the norm. It often catches you with your guard down. It's like that detour sign that pulls you off the main highway onto unknown roads.

It happens all the time in the computer industry, and it's been the downfall of many a good MIS manager.

The no-name brand

If discontinuous change was the only thing you worried about, perhaps it wouldn't be so bad. But one of the problems with being an MIS manager is that you wear about 30 different hats, depending on the time of day and whom you are talking to.

You're a technologist, versed in the arcane lore of information science, knowledgeable regarding computers and communications and handy with a screwdriver and voltameter as well.

You're a wily executive, hobnobbing with the company's top management, maneuvering with graceful Machiavellian skill in the hazardous climes of Mahogany Row.

You're a strategist, attuned to the company's long-range goals, a visionary who sees the big picture, who knows how information processing will boost your organization's fortunes and bring your competitors to their knees.

And — here's where discontinuous change rears its head — you're a soothsayer. Your management expects you to be able to anticipate sudden changes in technology and expects you to be able to see what's around the bend. You have to be able to assess the impact of these changes on your business and make the right recommendations.

But beware; If you say the wrong sooth, it could cost your company millions and maybe your job. So, what to do? One manager phrases it simply: "Stay loose." He runs a large MIS operation within a Fortune 50 company. It's a high-visibility job with all the advantages and drawbacks.

Continuous change, he says, is what most managers are trained to handle. You extrapolate the future based on the happenings of the past. You expect a smooth curve, not a sudden deviation. Managing, in terms of continuous change, is the basis for constructing logical, long-range plans and, too often, building rigid bureaucratic controls.

Unfortunately, the world doesn't work this way. Just when you least expect it, circumstances throw you a curve. Plans constructed on the premise of continuous change are first and foremost the enemy of adaptability.

"I encourage the managers in my organization to think in terms of discontinuous change. . . . We expect it to happen," the MIS director says. "It makes life more difficult, but it reflects reality, especially in the computer industry. We constantly face the challenge of deciding whether or not to adopt a change in technology or in the way we do things that could cost the company significant dollars and resources."

Another interesting problem he has encountered is explaining the advantages and disadvantages of a new technology to his nontechnology-oriented top managers, particularly when it calls for a major modification to the management models they have constructed based on the anticipation of continuous change.

Of special interest is what he calls "mysteryware." These are the technologies that feel kind of good, but you're not really sure precisely what they're going to do for you. Lotus' Agenda and many artificial intelligence programs fall into this category.

'Of course," the MIS director admits, "my department uses continuous-change models to make decisions as well. When someone else does it, we call it bureaucracy; when we do it, we call it practical management controls. But in our strategic thinking, we put our primary emphasis on the inescapable fact that discontinuous change is a way of life in our industry. This mindset prepares us to deal with the unexpected in much more productive ways than if we simply

Continued on page 21

Kirkley is a computer industry writer, editor and consultant based in Warwick, N.Y.

Taking your PC overseas?

If it breaks, try not to ask a friend to help you get it fixed

CHARLES P. LECHT

If you are one of those people who travel a lot toting a portable computer, you may soon be faced with the problem of how to get it repaired somewhere other than the city in which you purchased it. The little tote-alongs do break down on occasion.

Most portables cannot be serviced outside of the country in which they were bought. And even if service is available, finding it and having it performed in a timely way is almost impossible. Thus, prospective purchasers of laptop systems who intend to take them abroad should explore the availability of foreign service before deciding which system to acquire.

The idea to write this cautionary note occurred to me after a call I received from a French friend visiting Tokyo on a business trip recently. "My portable is on the blink," he said. "Can you help me find out who repairs it here?"

I'd been asked this question before and shuddered when I heard the name of the system he needed repaired. It was a popular portable made in Japan for export to Europe, America and any other country willing to use only the English alphabet.

Unless my friend was planning on a very long stay — long enough to allow his system to be sent to Europe or the U.S. repaired and returned to Tokyo — the answer was one he wasn't going to like.

Export models bearing the English alphabet and not Japanese characters will find no buyers in Japan itself. Maintenance of these machines is, quite logically, removed to the countries in which they are sold.

When my visitor detailed the problems he'd encounter if he couldn't get his tote-along working, I offered my sympathy. I tried to dissuade him from testing our friendship this way by telling past horror stories of similar fruitless searches for maintenance in Tokyo's scorching summer heat.

"But this is Japan," my friend stammered. "The thing was made here. There must be somewhere we can go to get it repaired."

I explained that these two conditions do not necessarily go hand in hand. "Why didn't you find out if maintenance for your little machine existed here before you bought it and brought it here?" I blurted out.

But I knew the answer. Most of my friends who've purchased expensive laptops behaved more like a teenager buying his first new car rather than acting like serious business persons acquiring a corporate weapon.

My friend persisted in his bid to get me to help him out. "The

Continued on page 21

THOMAS PAYNE

Lecht is an IDG News Service correspondent based in Tokyo.

Please don't play B17

WILLIAM D. HARRISON

One of the most fascinating pieces of computer peripheral equipment that I've worked with was the RCA Record File unit.

In the early 1960s, most computer companies were attempting to develop low-cost mass-storage memory devices.

RCA's computer systems division decided to capitalize on design work developed throughout the years by companies that manufactured record-playing equipment — better known as jukeboxes — for restaurants.

For a quarter, you could select three songs of your choice on a jukebox. A circular basket held the 45 rpm records. A customer selected a record by pressing the button for, let's say, B17.

The circular basket turned until the selection reached the top. A mechanical arm picked out the record and placed it on a turntable.

In the groove

The design of the RCA Record File resembled a jukebox, with two exceptions. The Record File used a magnetic coating instead of grooves, and a decision was made to increase the mechanical speed requirements.

Using a magnetic coating on the records in the Record File was a good idea. But increasing the mechanical speed was a case of "optimistic requirements."

The first demonstration of the Record File unit was an exciting event. The lights on the RCA 301 computer console flashed, the appropriate commands were sent to the Record File unit and the basket of records began to turn. The selected record passed by the top position, but with a little back-and-forth motion, the unit positioned the record correctly.

The selection arm reached out and removed the record from the basket. The arm lifted the record back and, with the grace of a discus thrower, sent the record sailing across the room.

As the platter whooshed by my ear, intuitive reasoning told me that the Record File unit would require more work before it could be unveiled to the world.

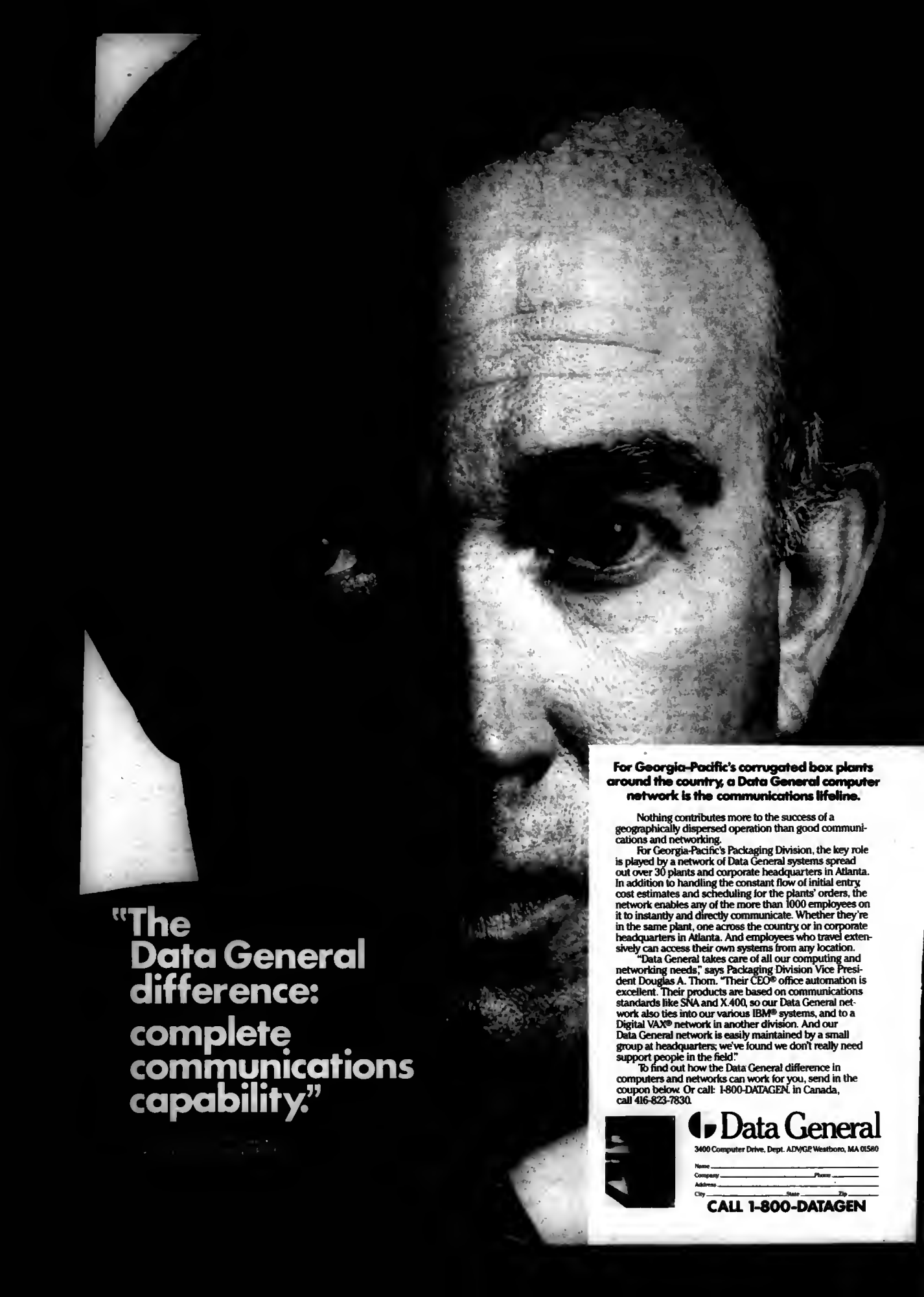
Whittling its way

The problem of optimistic requirements is not unique to the RCA Record File project. Optimistic requirements try to work their way into every project.

Whether it is memory required for the final product, time to execute transactions or how much code a programmer can produce in a month, optimism can sow the seeds of failure.

A project can end in disaster unless the optimism of requirements is balanced with the pragmatism of, "What is technically possible and reasonable to achieve in the time available?"

Harrison is an engineering manager at Siemens Information Systems in Boca Raton, Fla.



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Lecht

CONTINUED FROM PAGE 19

conference starts in two days," he said. "I need the data on one of the disks and a program I wrote to give my presentation. And I carried it all this way," he added, trying to reach my soft spot.

I suggested that carrying the laptop to Tokyo wasn't all a wasted experience even if it didn't work. His laptop, being at least 20 pounds of electronics, could be used in place of weights for exercise in his hotel room.

But he wasn't buying my reasoning and, wanting to keep his friendship, I folded and said that I'd try to help him out — although it was against my better judgment.

Playing a losing game

I called around a bit, and it didn't take very long for me to realize that I was playing a losing game. No one in the domestic manufacturing company knew where the French version of this system could be sent for repairs, except maybe back in France.

Frustrated, but not one to give in easily, my French friend called the company's export division to ask if getting the system repaired in Japan was possible during his stay.

He soon learned that no one spoke French in the export division — just English — and those who could speak some French couldn't understand why he didn't take the system to the U.S. to get it repaired.

Searching for an unorthodox solution to the now-mounting crisis, we called a place in Tokyo's famed electronics city, Akihabara, where, it is said, anything electronic can be found, made or repaired.

The person we reached suggested that if the system could be brought over, the shop's excellent and self-taught engineers would take a crack at its repair.

We then hurried to this place that shares space under a railroad trestle with what appeared to be 100 crowded shops. Each featured a cluster of different-size bins, laden with transistors, capacitors, boards, connectors, pins, chips — you name it and it was there. It looked like the remains of a computer factory after being hit by a cyclone.

When asked to leave the computer at the shop, my friend seemed edgy and disinclined to do so. Then my friend reminded me that his warranty would probably be voided if one of these self-taught engineers touched his system.

I hid my irritation at his concern and began wondering why he had brought the machine over in the first place. Just to show it off to people?

On the day of my friend's presentation, I raced over to the conference to commiserate about his broken laptop. He seemed unduly happy for a guy who was in trouble, and it didn't take long for me to realize why. Hanging from his hand was — you guessed it — a new laptop, and not the same brand as the one he had brought to Tokyo.

He took great pleasure in demonstrating it to me while exclaiming in a wondrous, childlike way, "And this one can run the program written for the last one and use its data disks, too."

"I've been had," I muttered to myself. But I took comfort in knowing that on his return to Paris, there would be no repair facilities available for his new portable.

Kirkley

CONTINUED FROM PAGE 19

kept our heads buried in the sand."

Other companies take a different approach. Instead of expecting the MIS manager to be the resident futurist as well as handling all the other day-to-day jobs that come with the territory, they have designated an individual or a team to keep track of the new and the unexpected.

For example, one futurist I spoke with is now examining such emerging technologies as electronic data interchange, natural language I/O, videotext and compact disk/read-only memory to see how they fit into her organization.

"I build scenarios," she says. "I try to sort out the various technologies, and I bring to my management only the ones that I think will have a definite impact on realizing our business objectives. We do a pilot when the technology has been around for a while. We're not into taking big risks or being pioneers. . . . We only become involved with the technology when we can demonstrate its relevance to our business."

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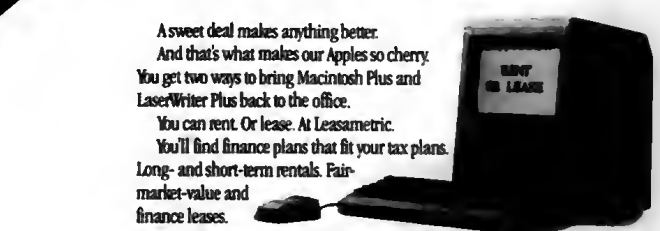

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SOFT TALK

Stanley Gibson

X/Open: First steps

My 4-year-old daughter just loves stickers. No sooner does a bunch of bananas enter our house than the little blue stickers that come on them are removed. Soon, they begin to crop up on most any surface.

With this phenomenon in mind, I had a few qualms about the X/Open branding program, part of which is to distribute X/Open labels to vendors that say their products conform to X/Open guidelines. My first reaction was that such a program trusts too much the self-control of vendors that may be tempted, like my daughter, to affix stickers indiscriminately.

Will the X/Open brand become a symbol of trust, or will it lose its value through irresponsible use? I put that question to X/Open President and Chief Executive Officer Geoffrey Morris.

His response: You can sue the vendor if its product doesn't conform. In warranting X/Open compliance, the primary legal responsibility rests not with the X/Open organization but with the vendor whose product bears the X/Open label.

Continued on page 28

Beech flies high with VAX 8820

Early user gets vital power boost from DEC's IBM mainframe challenger

BY ROSEMARY HAMILTON
CW STAFF

WICHITA, Kan. — With the recent installation of a Digital Equipment Corp. VAX 8820, Beech Aircraft Corp. engineers are coming home again.

When Beech's engineers could no longer be adequately supported by the engineering group's two VAX-11/780s, they went outside the department to the corporate mainframe, an IBM 3090. But in March, Beech became the first customer site to receive a VAX 8820, announced that month as a competitor to IBM's smaller 3090s. In July, Beech went into production mode with the 8820 and began cutting its dependency on the corporate 3090.

The new system, combined with the existing VAXs in a cluster, will give the engineering department a system capable of 12 million instructions per second (MIPS), more than enough to support the staff of 250 engineers, according to Ernie Tooley, manager of Beech's scientific computing center.

DEC launched the 8800 series as a direct assault on IBM's low-end 3090s. The systems, with ratings as high as 22 MIPS, feature a symmetrical multiprocessing capability, which is said to greatly improve a multi-CPU system's throughput when compared with an asymmetrical multiprocessor or a master-slave configuration.

The systems can also be used in parallel processing mode. The 8800s, depending on the model, are made up of as many as four VAX 8700s. They were announced with a prerelease version of DEC VMS 5.0, which supports the symmetrical multiprocessing environment.

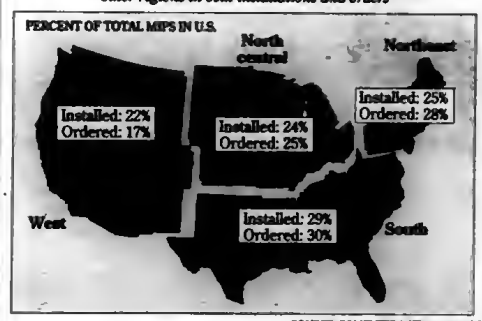
Beech intends to convert existing programs to the parallel processing mode. This would require identifying which segments of a program could be processed in parallel. Then a new Fortran compiler provided by DEC would have to actually convert the programs to the new

Continued on page 26

Data View

MIPS across America

Estimated distribution of computing power shows the South leads other regions in both installations and orders



SOURCE: COMPUTER INTELLIGENCE
CW CHART

DG lightens up on CEO

BY AMY CORTESE
CW STAFF

Data General Corp. earlier this month announced CEO Light. No, it's not a low-cal beverage for power lunches; it's a streamlined version of DG's CEO integrated office automation software for small-system users and value-added resellers.

CEO Light offers the basic features of the traditional CEO product but with reduced system memory and disk space requirements as well as a substantially

Continued on page 31

Bellcore puts neural nets on a chip

ANALYSIS

BY AMY CORTESE
CW STAFF

MORRISTOWN, N.J. — The research arm of the Bell operating companies, Bellcore, has packaged a neural network on a chip, a move that several observers say will make neural networks an add-on technology to existing processing.

The chip set reportedly performs 100,000 times faster than a neural network simulated with software on a general-purpose computer.

Unlike the standard sequential process of solving problems, neural networks "learn" by storing data on patterns and then matching fresh input to previously designated patterns. Such a process has been finding increased commercial use as it is used to teach machines to read different styles of print, inspect

Continued on page 30

Inside

- Dasco installs Storage Technology's automated library. Page 25.
- Vendors give advice on benchmarks. Page 25.
- Bank of Tokyo buys $4 million in Hogan software, services. Page 25.
- Computer Complex sells to Aussie gamers. Page 25.

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Building a tape library

Deere automates cartridge handling, aims to boost productivity

ON SITE

BY JEAN S. BOZMAN
CW STAFF

MOLINE, Ill. — What weighs 8,500 pounds, is 11 feet in diameter and has 12 sides? A Storage Technology Corp. 4400 Automated Library System.

More than 100 sites worldwide have installed the Storage Tek units since shipments began in July — and now, farm machinery manufacturer Deere & Co. is waiting for its own library system to be installed here next February or March.

Plastic cutouts of the library are being used to place six of the 12-sided silos around Deere's computer room floor. The first two are being installed this week, with four to follow by March. When completed, the library will hold a total of 30,000 tape cartridges of the type used in IBM 3480 cartridge drives. But that number is just a fraction of the 85,000 3480-compatible tape cartridges at Deere.

"It's the old 80/20 rule," said Charles R. Townsend, manager of Deere Computer Centers. "We're going to select the tapes we use most frequently for storage in the library system."

Storage Tek's library is based on modules containing four cartridge drives, and each module, or "silo," is capable of holding 6,000 cartridges — although Deere will only load 5,000, leaving space for additional cartridges. The largest system includes 16 of these Library System Modules (LSM). A robotic picker arm in the silo can be positioned next to the selected tape within 12 seconds — and can mount it in a nearby drive just a few seconds later. Video cameras are used to monitor the system, since the cabinets have no windows. Human operators can reach the interior through an access panel.

Shaving time

By preselecting the most frequently used cartridges, Deere hopes to boost productivity by a factor of four. "We mount 1.75 million tape cartridges a year," Townsend said. "Our average time today to mount a tape is 80 seconds, but that's using a person to find the cartridge. The average time for the silo is less than 20 seconds." Storage Tek claimed seek times as low as 12 sec.; Townsend said he would be happy with 18.

Deere's aim is to automate one of the final frontiers of human intervention in a modern-day computer room — the tape library operators. One of Deere's stated MIS goals is to work toward lights-out operations of its computer facilities wherever possible. "Automating our tape operations is just as important as automating our computer consoles," Townsend said.

Until now, Deere's library staff has selected mainframe-requested tapes from rows of cartridge bins and carried them across the room to waiting cartridge drives. Once the tapes are loaded, mainframe computers running IBM's MVS/XA can draw the information into the IBM computer's main memory.

Early users, including TRW's Information Systems Division in Richardson, Texas, have had as much as two months' experience with the 4400 library system.

The TRW division uses its library system to fetch cartridges containing the names on direct-mailing lists for consumer products. TRW plans to permanently

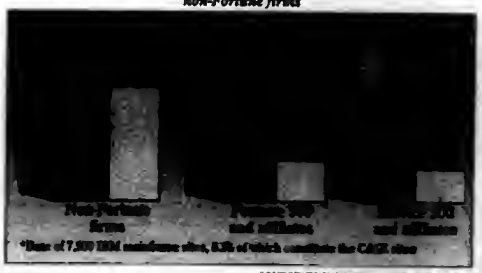
Continued on page 31

A Robotic arm *picking its favorite tape?*

Data View

Profile of CASE tool users

The greatest penetration of computer-aided software engineering tools occurs among the largest corporations rather than among non-Fortune firms



SOURCE: FOCUS RESEARCH SYSTEMS, INC.

SOFTWARE NOTES

Tokyo bank picks Hogan

The New York office of The Bank of Tokyo, Ltd. recently signed $4 million worth of software and services agreements with **Hogan Systems, Inc.**

Hogan will install all modules of the latest release of its International Money Management System (IMMS), an on-line, real-time, international banking system running on IBM mainframes. IMMS includes modules that support foreign exchange, money market trading, international lending, customer information, multicurrency accounting and global positions and exposure management.

Cullinet Software, Inc. recently announced that it will utilize artificial intelligence software from **Logos Corp.** to translate software documentation for international markets.

The software is expected to let Cullinet offer its products in foreign markets faster than was previously possible, said Jeff Papows, Cullinet vice-president.

Sage Software, Inc., based in

Continued on page 26

Checklist for DBMS buyers

BY J. A. SAVAGE
CW STAFF

CUPERTINO, Calif. — Until vendors agree on standards for measuring transaction throughput, potential buyers should put benchmarks through a checklist to see if vendors are matching fruits or trying to sow new varieties, officials at Tandem Computers, Inc. said at a recent Benchmarking Forum here.

Several vendors, including Digital Equipment Corp. and relational database vendor Oracle Corp., have been flaunting seductive transaction processing benchmarks in the last several months. Those numbers, however, are not based on the same sets of variables. Users must look beneath the surface to find out how to relate throughput to particular hardware or software.

Tandem Computers, Inc. documented the first Debit/Credit benchmark in March 1987, when its computers ran 208 transaction/sec. under its Nonstop SQL in audited results. The benchmark was widely hailed as a fair implementation of criteria defined in an earlier *Datamation* article. Thus Tandem is attempting to cite criteria as an authority in the field.

One for all?

Tandem and 16 other companies have joined the Transaction Processing Performance Council, led by Omri Serlin, president of Los Altos, Calif.-based Itom International. Serlin said he has asked the council to decide on standard parameters for a Debit/Credit benchmark by the end of the year.

Until a standard emerges, potential buyers should check the

Continued on page 30

HARD BITS

Computer Consoles hits Aussie jackpot

Computer Consoles, Inc. in Waltham, Mass., said it sold five multiprocessor systems to the Golden Casket Art Union, a private company that runs gaming services under the government authority of Queensland in Australia. The deal was valued at $16 million. Installation is expected to be completed in the first quarter of 1989.

An optical standards group is meeting tomorrow in Los Angeles to discuss efforts being made to achieve standards for this storage medium. The meeting was organized by Peripheral Strategies in Santa Barbara, Calif., a market research firm, and is open to both manufacturers and users. It will take place at the Sheraton Plaza la Reina Hotel. The goal is to define a charter and begin to schedule activities.

Ncube Corp. in Beaverton, Ore., introduced hardware and software products intended to let its parallel processor-based supercomputers function as coprocessors to the Sun Microsystems, Inc. workstation platform. The company said users on a Sun workstation with the hardware and software enhancements could develop parallel processor programs.

Hewlett-Packard Co. this month shipped its one millionth display terminal. When HP shipped its first terminal 14 years ago, the price was $3,000. The terminal that shipped this month was priced at $395. It uses 95% fewer final assembly parts than its ancestor and takes 92% less time to build, according to the company.

Teledyne Semiconductor recently signed a contract with **Apollo Computer, Inc.** in Chelmsford, Mass., for workstations and Apollo's networking products. Teledyne will use the Apollo Series 4000 Personal Super Workstations for front-end integrated circuit design, while the Apollo network will link Teledyne users to a series of systems in the company, according to Apollo.

Engineers at the **University of California in Santa Barbara** recently received a $1.6 million grant from the National Science Foundation for a three-year research in crystal growth for the next generation of **compound semiconductors.** Compound semiconductors are made from mixtures of such materials as gallium and arsenic.

Scientific Computer Systems Corp. in San Diego said it opened subsidiary operations in both West Germany and the UK. The company makes a series of supercomputers that it says are compatible with Cray Research, Inc. supercomputers.

Control Data Corp. said it tied up a $4.1 million deal with the People's Republic of China for five Cyber 930 systems and three Cyber 910-300 graphics workstations. The systems will be used by five industry institutes in China, including the East China Institute of Chemical Technology and the Beijing Economic Research Institute.

Beech

CONTINUED FROM PAGE 23

environment.

Tooley said his department has encountered problems with its 8820 typical of those one would find with "the first system out the door," but he said he is satisfied with its overall performance. For example, Tooley said there was an unexplained problem with the error formatter, but DEC has said it would fix it.

But beyond routine glitches, the new system gets high marks from the engineering group, Tooley said. "For a couple of years, we had been running without enough power. In August, we doubled the number of CPU hours [in the engineering department] from a year ago," he said.

The 8820 was actually a last-minute switch for Beech. In July 1987, the company had decided to purchase a VAX 8800, a dual-processor system with a master-slave configuration. It was at the time the top of the line and would have been installed in January of this year. "Then we got nondisclosure information on the [symmetrical multiprocessor VAX]," Tooley said.

Beech's engineering staff had set up a committee to select a new system. The department wanted its own computing center instead of looking to the corporate center for service. According to Tooley, the committee determined that engineering would need as much as 24 MIPS of power within the next five years. They decided to stay with DEC because the support staff within engineering was experienced with VMS and the engineers expressed a preference for the interactive VMS environment.

Making the choice

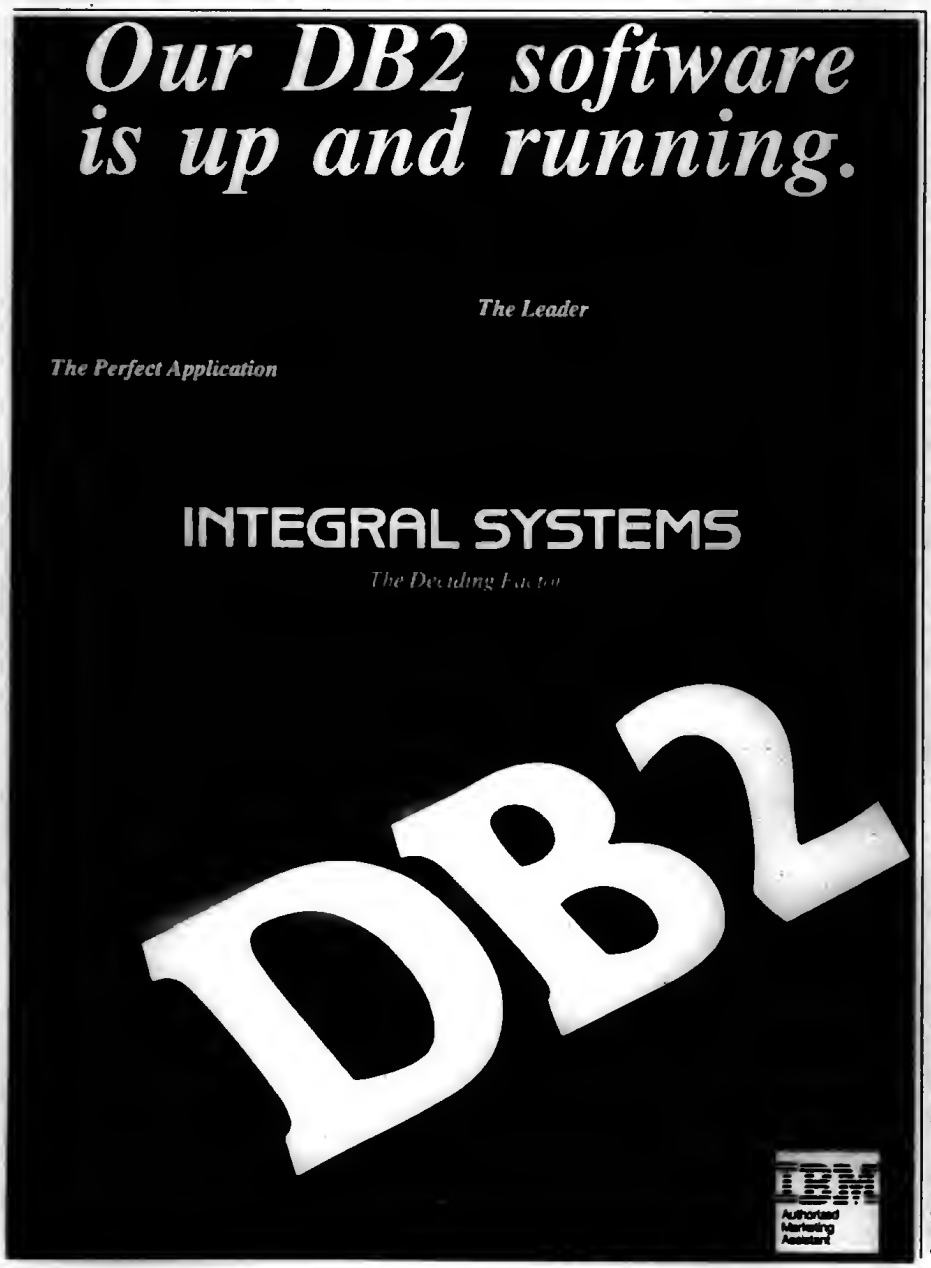
The committee compared the 8800 with the 8820 and realized that the 8820 would cost more, but it was a reasonable increase. Plus, the 8820 had features the other did not.

Beech paid $1.85 million for the total system, including peripherals. Although he would not break out the CPU price, Tooley said the 8800 and 8820 CPU prices were approximately the same.

What swayed Beech's engineering group were two factors: the parallel processing and the ability to expand the 8820 through field upgrades to a system approximately twice its size.

Tooley said he is impressed with the clustered environment that his group set up with the 8820. "The No. 1 benefit overall has been the cluster," he said. "It's made a tremendous difference to us."

Tooley said he expects the move to the 8820 parallel processing environment to take from one-and-a-half to two years. Several engineers wrote their own programs for use on the IBM 3090 that now need to be converted. Tooley said three programmers will be assigned to assist in the conversion and he expects engineers who wrote programs to work on conversions as well.



Notes

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Rockville, Md., recently reached an agreement with **Perot Systems Corp.** under which Perot Systems will market Sage's APS Development Center products within the federal government. In addition, Perot Systems will provide training and professional services to APS Development Center users in North America. APS Development Center products are used to design, generate and test IBM-based application systems.

Molecular Design, Ltd. in San Leandro, Calif., and **Interleaf, Inc.** in Cambridge, Mass., recently signed a cooperative agreement to develop, market, sell and support software for an electronic publishing system for chemical document processing. Under the agreement, Molecular Design will supply an interface from its personal computer program, Chemtext, to Interleaf's Technical Publishing Software, which runs on a variety of workstations.

Chemtext is an image-and-text processor designed specifically to help chemists document chemical information. Technical Publishing Software is an electronic publishing system intended for large-scale technical documents.

Learning Odyssey in San Diego recently signed a license agreement with **Cadam, Inc.**, a subsidiary of Lockheed Corp., that will allow Learning Odyssey to use the look and feel of Cadam's user interface.

Learning Odyssey will use the interface in its Junior Drafter CAD training system, an interactive instruction system intended to teach computer-aided design. The user interface consists of menus, prompts and logical procedures contained in Cadam's Interactive Design System.

Palette Systems, Inc. in Nashua, N.H., recently announced it will provide an interactive graphics software system to be used within an automated shop-floor inspection system for printed-circuit boards to be installed at the Raytheon Equipment Division in Waltham, Mass. **Digital Equipment Corp.** is acting as systems integrator for the project.

Palette graphics will serve as each inspector's visual interface with Raytheon's inspection system for printed-circuit boards. Raytheon's system checks component insertions and other board assembly processes. Palette Systems is a DEC Cooperative Marketing Partner.

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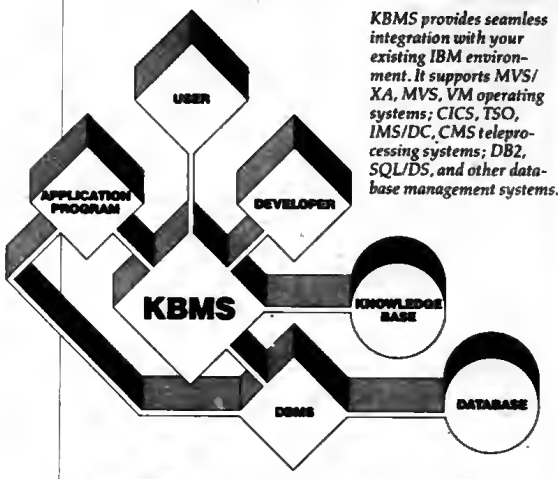

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Minisuper firm trundles out its first series

MADISON, Wis. — Several minisupercomputer companies have had dark days recently, but that is apparently not stopping newcomers from taking a shot at the market.

Astronautics Corporation of America recently introduced the ZS series of Advanced Computer Systems. The series has a starting price of $295,000.

The company said it is shipping the ZS-1 and ZS-2 and that additonal ZS models will be rolled out in the next several months.

The ZS-1 is a single processor system that is based on a parallel scalar architecture. The ZS-2 uses a dual-CPU design and is based on a tightly coupled, multiprocessor design. Both systems run under the company's implementation of the Unix operating system. They support Fortran, C, Pascal and Common Lisp.

The company said it will offer the Ada programming language next year, along with connectivity tools to the IBM MVS and Digital Equipment Corp. VMS environments.

Users can field-upgrade a ZS-1 to a ZS-2 because both systems use the same main memory and I/O processor.

Gibson

CONTINUED FROM PAGE 23

A vendor, thus sued, would gain a black mark that would jeopardize its business. Public opinion against a vendor who mislabels would be sufficient police action, Morris said.

A good analogy, Morris said, is to be found in the description "IBM-compatible," which IBM Personal Computer clone makers used to good effect in creating a de facto industry standard. If a vendor advertised its products as IBM-compatible and they were not, then the press and users would soon ostracize that vendor. There were few examples of vendors who promised compatibility but failed to deliver it, Morris pointed out.

With the X/Open guidelines, it could work the same way. But there are differences.

First of all, the IBM PC standard was driven by the world's largest computer company. Smaller vendors, believing that they could grab a piece of the market by imitating IBM, flocked to the standard. Software vendors, believing that there would be a large number of IBM and compatible PCs to run their programs, were eager to write programs for those machines.

In contrast, most vendors announcing X/Open support have a variety of products, only some of which will be X/Open-compliant. IBM is an X/Open member, but it is unclear exactly which IBM products will be X/Open-compliant and to what degree.

In addition, X/Open is offering its brand to certify some four levels of compliance. One must read the small print on the blue-and-orange X/Open label to see to which level the product conforms. X/Open Base and X/Open Plus apply to hardware systems, while X/Open Component and X/Open Application apply to software.

> WITH THE IBM PC standard, a PC either was or wasn't a clone.

The products now certified comply with the X/Open Portability Guide 3, published in the fall of 1988. Logos issued this year will have an "88" on them. Presumably, those issued next year or the next year in which a new version of the portability guide is issued will have that year imprinted on them.

The buyer, therefore, must learn these distinctions before shopping or else risk buying something with the X/Open label and finding out later that it does not conform to the level that will suit his needs.

With the IBM PC standard, there was no such thing as "compatible at certain levels." A PC either was or wasn't a clone.

By the end of the year, all companies will be able to self-test, with X/Open reserving the right to audit at random to ensure that tests are being run and the X/Open logos are being used correctly.

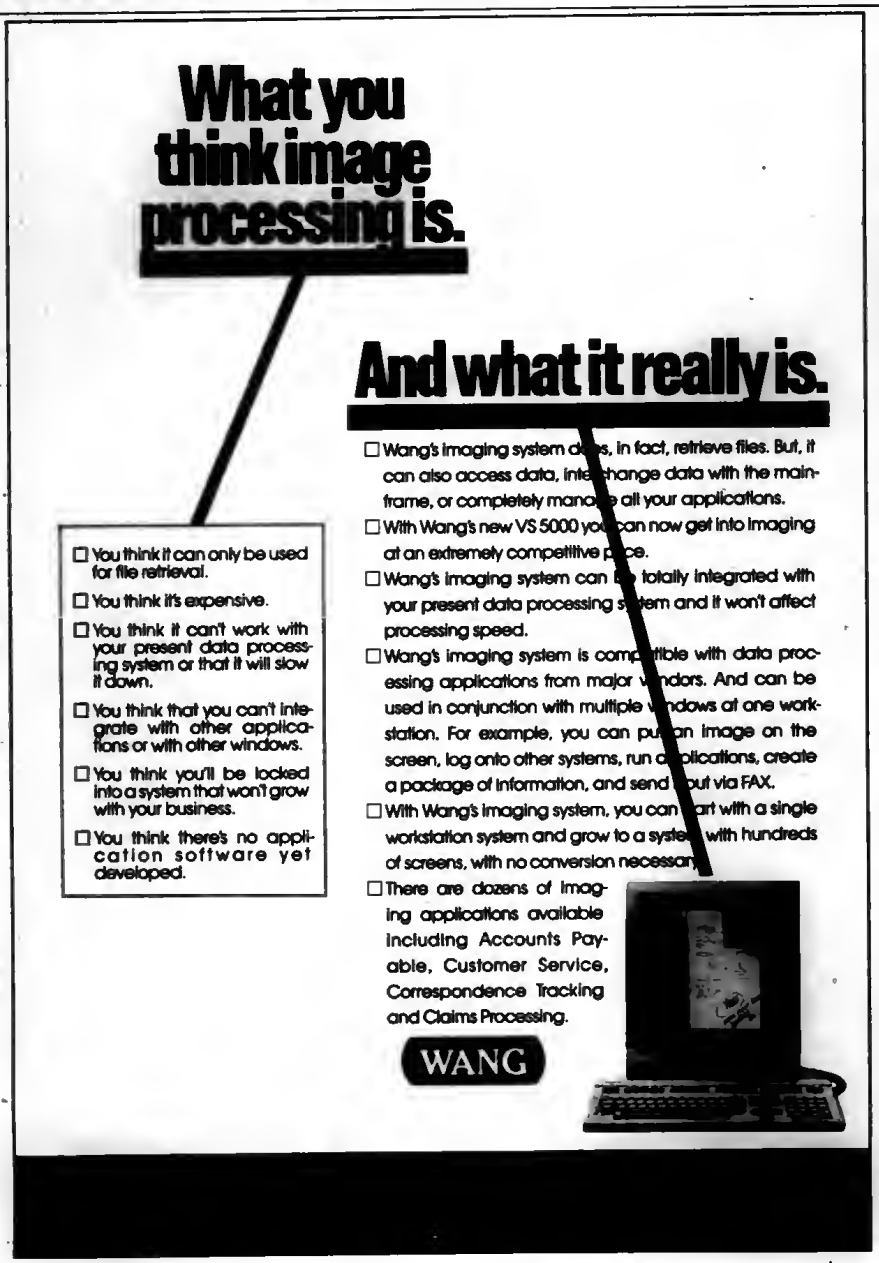
Opening doors

X/Open is not a huge organization with a large staff of international enforcement agents. Thus, the goodwill and responsibility of vendors will be key in helping to establish the standard.

Despite all the explainers and the reliance on the computing community to correctly label, X/Open deserves to be applauded for producing something concrete in the way of standards branding. Indeed, if X/Open were intimidated by all possible criticisms, the goal of industry standards would never get off the ground. All things considered, X/Open does have a good chance of success.

A buyer will have to read the fine print, but at least there is fine print to read.

Gibson is *Computerworld*'s senior editor, software.



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Checklist

FROM PAGE 25

following variables in benchmarks:

• **Mirrored logs.** Mirroring changes to an application database improves the system's ability to re-create the transaction in case of failure.

• **X.25 wide-area networks vs. local-area networks.** Using a LAN instead of a WAN can save up to half a second per transaction.

• **Concurrent sessions.** Potential buyers should check to see how many are being processed. The more such sessions, the slower the transaction — but the more valid the results.

• **Random or routine transaction arrival.** Constant transaction arrival can be processed in about half as much time as random arrival but is less likely in the real world.

• **Size of database.** The size of the system simulated is supposed to be scaled to conditions likely to occur with a Debit/Credit system in the real world. The database should contain 100,000 records per transaction/sec. to simulate real conditions. Since most vendors are claiming more than 100 transaction/sec., their databases should contain more than 100 million records.

• **Copies of database.** The standard is one copy of the database; some, like IBM's DB/2, run multiple copies. If so, check to see if they all agree once the transactions are through.

• **Response time.** For 95% of the transactions, it should be less than a second.

• **Auditing.** This could be one of the stickiest requirements, as there are no requirements for what constitutes an independent auditor. Serlin said the council is discussing putting a sort of Good Housekeeping Seal of Approval on audited results, but it seems the group is not likely to issue any auditing guidelines in the near term.

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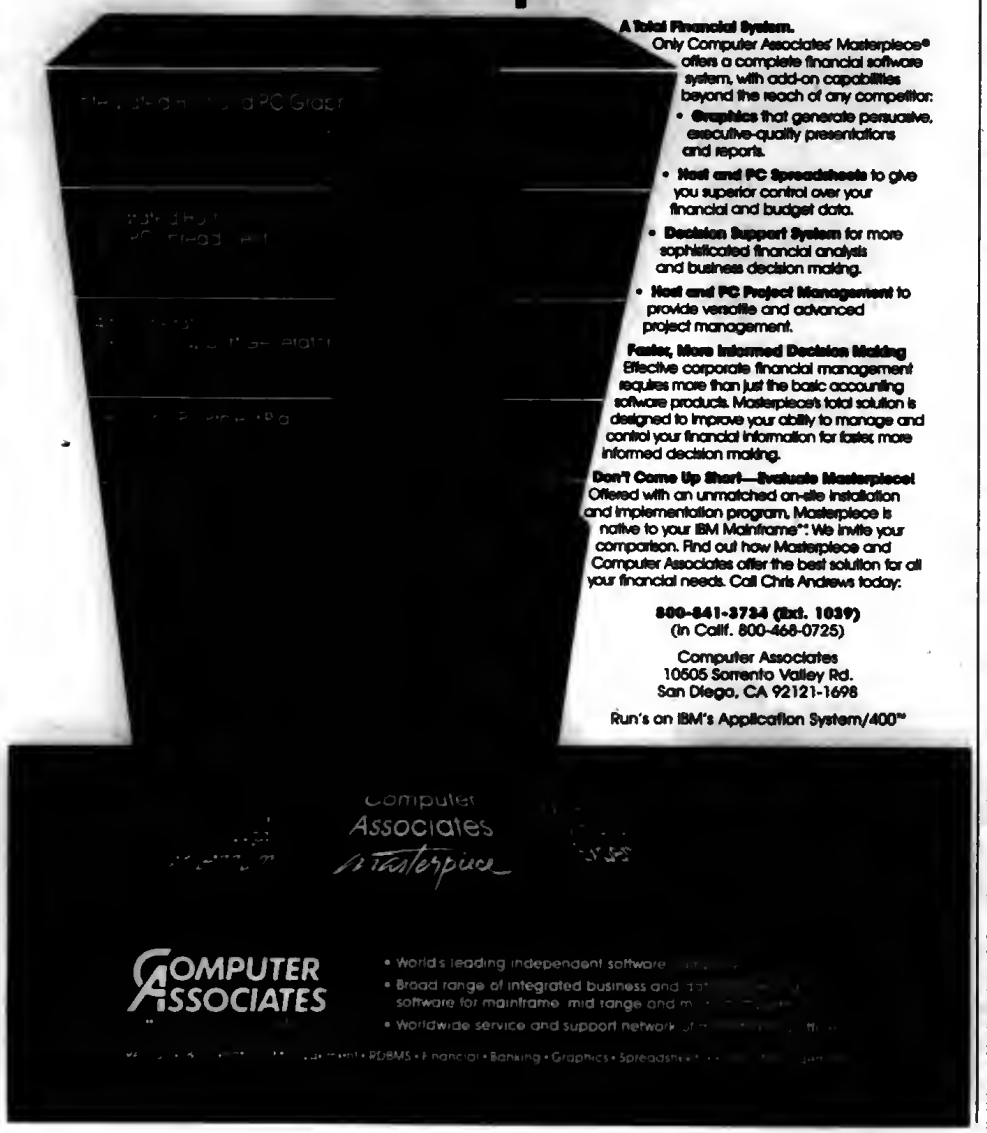

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Bellcore

FROM PAGE 23

goods in a manufacturing process or look for desirable trading situations in the stock market.

Harvey Newquist at The Relay Group in Scottsdale, Ariz., said putting a neural network on a chip is a way around the constraints of neural network software running on a sequential processor.

Integrated chip soon

Although opinions differ on how soon such a chip will find its way into commercial devices, most analysts agree it will be integrated with existing hardware and software systems.

"Neural network systems will add functionality to existing systems, as opposed to being stand-alone," says Edward Rosenfeld, editor of the "Intelligence Newsletter," which specializes in neural network coverage. He sees them acting as front ends and back ends to conventional systems.

Rosenfeld says there are at least a dozen companies working on chip implementations, and that we are likely to see "a plethora of neural network chips arising from a variety of sources" in the near future, including traditional chip manufacturers such as Intel Corp., Motorola, Inc. and Texas Instruments, Inc.

In addition, many of the largest users, such as Ford Motor Co. and Du Pont Co., are said to be working on systems with neural network vendors.

Neural networks attempt to mimic the biological processes in the brain, where electrical impulses travel over a network of synapses. Current theory states that learning is caused by changes — a strengthening or weakening — in the connections between neurons.

A neural network learns similarly by reinforcing the strength of the electrical connection between the processing nodes.

Not everyone agrees that commercialization of neural networks is imminent. Although acknowledging that the development tools and coprocessor boards for specialized hardware are available today, a report from the Framingham, Mass.-based International Data Corp. predicts most neural network implementations will not be feasible until at least 1990.

DG CEO

FROM PAGE 23

lower price tag.

CEO Light includes mail, calendar and filing features. Other features standard with full CEO, such as word processing and decision support, are options that can be purchased separately. The price for CEO Light is about half that of its full-function counterpart. The price on an MV/1400 is $1,800, compared with $5,360 for CEO; on an MV/20000, the cost is $28,000, compared with $50,015.

According to Bruce Evans, senior product manager of office software at DG, CEO Light was designed to be modular so that applications could be plugged into the main menu easily. Along with trimmed-down features, CEO Light reduces system resource requirements by using native file structures rather than a file manager as CEO does.

Broad spectrum

Christine Wallis, manager of DG's OA market development, said the product was intended to broaden the CEO product into a product line and extend CEO capabilities down to the low end. The scaled-down version is targeted at those DG customers with low-end MV systems with limited memory and storage but who have a real need for mail, filing and calendar scheduling or any MV system with constrained resources.

Steve Widen, a consultant at Technology Financial Services, Inc., agreed. CEO Light makes the product attractive to the low end, where the majority of DG's systems sales are, he said. "DG is making its systems more competitive from a cost standpoint," perhaps in response to IBM's relatively efficient office software for the Application System/400, he said.

Widen added that DG must gain new customers, and targeting VARs is one way of doing that. One VAR who saw the product demonstrated is Ken Anderson, president of Vantage Software, Inc. in New York. In addition to the lower price, the product "embodies the major functionality of the CEO product, but I can present it in a simplistic way," Anderson said, referring to CEO Light's integration tools that allow better customization of the main menu than does CEO.

CEO and other OA software such as Digital Equipment Corp.'s All-In-1, have reputations for being resource-hungry. CEO was often too expensive for those not out looking for a full-blown OA system, and it added to the complexity, overhead and price of a VAR's product. "Now with CEO Light, I have an option for a trimmed-down version of an OA system I can give my customers," Anderson said.

Tape library

FROM PAGE 25

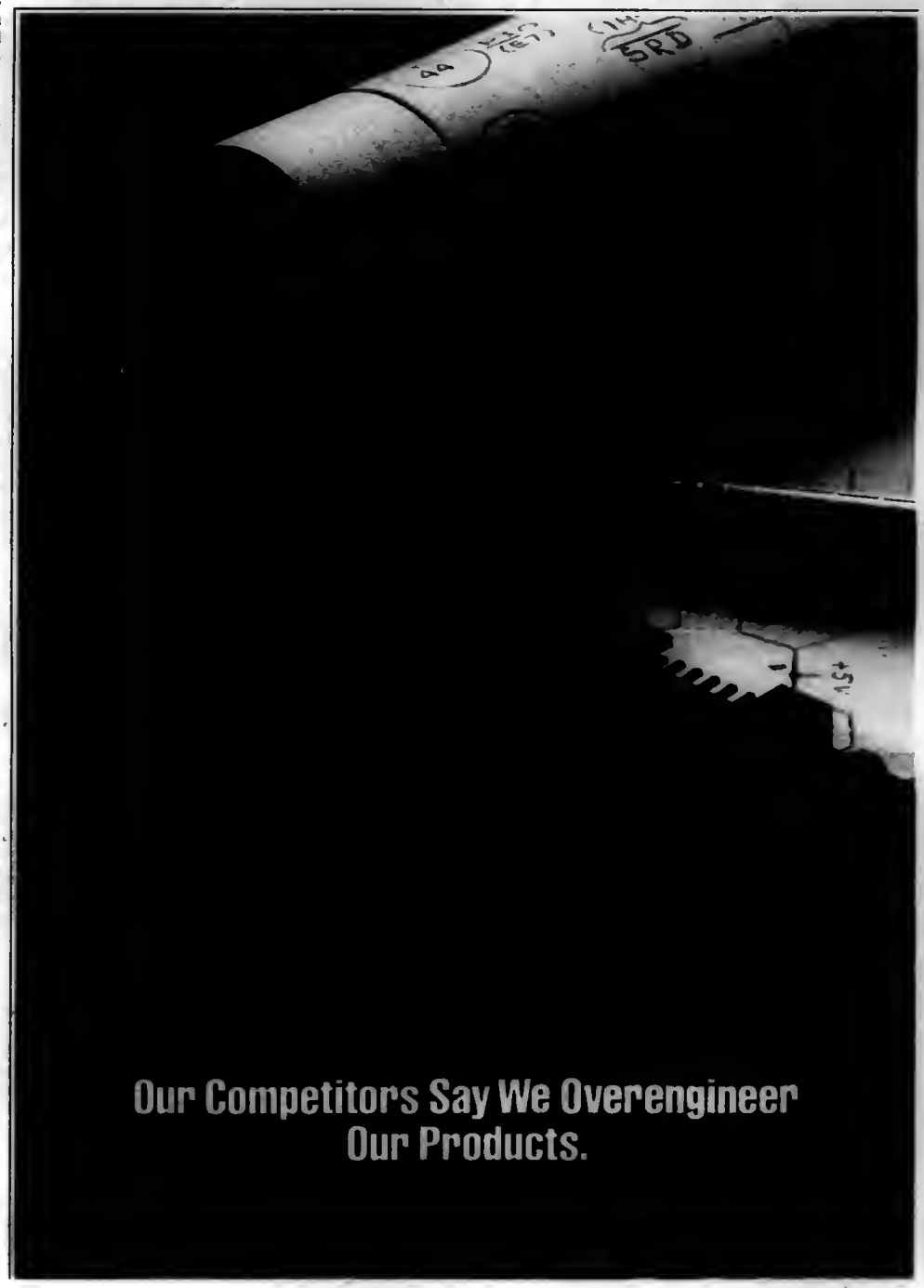
store 12,000 of its 20,000 tape cartridges inside the Storage Tek system. That way, its most important direct-mail databases would be virtually on-line and available to the mainframe at channel speeds of 3M byte/sec.

"We process a lot of data sequentially, and we process it on tape," said Tom Liles, vice-president of development and operations at the TRW site. "When we looked at a prototype of the system more than a year ago at Storage Tek headquarters, we knew we would like to get in on the early ship program."

TRW believes that automation of its database is critical, as human error has sometimes forced operators to stop a batch job in progress. "A human operator might file a tape in the wrong storage slot," Liles said. "If you're processing a data set with 100 cartridge tapes in it and you can't find number 91, you can't finish the job."

TRW is so pleased with its 4400 library system, which took two weeks to assemble and test, that it has ordered a second storage silo for installation early next year. The units sell for $500,000 each. Liles said he expects to retain the current operations staff of 14.

For now, Storage Tek's library system has no sizable competitors — although Maxstor is expected to announce a one-terabyte mass-storage device based on tape cartridges sometime this month.



NEW PRODUCTS — SOFTWARE

System software

Gould, Inc.'s Computer Systems Division has released the **MPX-32 Release 3.4** operating system for the Gould Concept/32 line of minicomputers.

The system reportedly offers several performance improvements over previous versions, including a faster context switch time and a faster interrupt response time. The latest release also features security enhancements, development environment improvements and new utilities and tools, the vendor said. The system also includes a help facility that provides users with on-line help information.

MPX-32 carries a price of $4,500.

Gould Computer Systems Division, P.O. Box 409148, Fort Lauderdale, Fla. 33340. 305-587-2900.

Database management systems

Henco Software, Inc. has released an international version of **Info-DB+**, a relational tool for structured data and free-text management. **Version 3.40** reportedly includes a gateway to Microsystems Engineering Corp.'s Mass-II word processor as well as on-line help for applications developers and end users.

The integration of Info-DB+ with Mass-II lets users work within the word processing package without leaving Info-DB+ or performing document conversions. Info-DB+ runs on all Digital Equipment Corp. VAX/VMS systems and includes a full text retrieval system, a relational database management system and an application development fourth-generation language.

Info-DB+ is priced from $4,500 to $165,000, depending on DEC VAX configuration.

Henco Software, 100 Fifth Ave., Waltham, Mass. 02154. 617-890-8670.

Development tools

Silvon Software, Inc. has enhanced its productivity tool software, which was designed for the IBM System/38 minicomputer series.

Newversion was introduced in January and reportedly allows System/38 users to automatically integrate custom software modifications with new releases and error corrections provided by individual vendors.

The latest release features merge and comparison report tailoring, and users can now access Newversion functions through both command and menu interfaces.

A 30-day free trial is available for System/38 users interested in evaluating Newversion.

Silvon Software, P.O. Box 266, Glen Ellyn, Ill. 60137. 312-668-9380.

Whitesmiths Ltd. has announced two **C language development tools** for IBM mainframes running under VM/CMS.

One of the packages is for users requiring C language cross-support for Motorola, Inc.'s MC68000-based embedded systems, the vendor said.

The software includes a proprietary ANSI-standard optimizing C cross-compiler and run-time libraries, command driver and C source-level debugger. A Motorola-type assembler and linker are required to use the package.

The second package is reported to be totally self-contained and enables mainframe users to develop C programs under VM/CMS for execution on Motorola M68000-based computers running Unix operating systems. A C cross-compiler, listing cross-assembler and linker are included. The product also offers support for Common Object File Format.

The first package costs $10,000; the second is available for $15,000.

Whitesmiths, 59 Power Road, Westford, Mass. 01886. 800-225-1030.

Languages

MBP Software and Systems Technology, Inc., has announced that **Visual Cobol 85** is now available for the IBM RT machine running the AIX operating system.

Visual Cobol 85 is a General Services Administration-validated native-code Cobol compiler that is based on the ANSI Cobol 85 standard. The compiler package reportedly includes an integrated screen management system, an interactive debugger, extended chaining utilities and multiple sort-and-merge options. The IBM RT incorporates reduced instruction set computing architecture and runs IBM's AIX operating system, a derivative of AT&T's Unix V.

Visual Cobol 85 for the IBM RT costs $1,995.

MBP Software and Systems Technology, Suite 260, 1131 Harbor Bay Pkwy., Alameda, Calif. 94501. 415-769-5333.

Apollo Computer, Inc. has released an enhanced version of its **Domain/Common LISP** artificial intelligence programming language.

Version 2.2 reportedly shows performance increases of as much as 55% on runtime benchmarks and compilation improvements of as much as 40%. Domain/Common LISP is a complete implementation of the Common LISP standard programming language for AI developers, and Version 2.2 offers support for Apollo's Domain/OS operating system.

Domain/Common LISP Version 2.2 is priced at $3,500. The product will be shipped as an upgrade from Version 2.10 to all Apollo maintenance customers.

Apollo Computer, 330 Billerica Road, Chelmsford, Mass. 01824. 617-256-6600.

Applications packages

A cost-management product that helps data center and network managers keep track of data processing equipment and software inventories has been developed by **Morino Associates, Inc.**

The **I/S Inventory and Assets Management (I/S IAM)** product is said to give multiple users with access to a central database of inventory records and asset-related financial information. When operating as a standalone package in an IBM MVS operating system environment, I/S IAM also provides cost analysis and chargeback information, including leasing, maintenance charges, taxes and depreciation.

I/S IAM costs from $10,000 to $29,500.

Morino Associates, 8615 Westwood Center Drive, Vienna, Va. 22180. 703-734-9494.

Software Partners/32, Inc. has announced an editor that was developed for users of Digital Equipment Corp. VAX/VMS machines.

Called **Editool**, the software reportedly includes split-screen editing, wild-card editing and cut-and-paste capabilities. An intelligent command line is also incorporated into the product, which includes a Help key.

The cycle key is used to scroll through all Editool commands.

Editool's price tag ranges from $395 for a DEC Microvax to $6,495 for a site license.

Software Partners/32, Suite 8, 447 Old Boston Road, Topsfield, Mass. 01983. 508-887-6409.

Utilities

Syncsort, Inc. has announced **Online-Syncsort**, a new facility developed to allow the interactive use of Syncsort OS.

The new product is IBM ISPF-based and is said to generate the control statements necessary for Syncsort merge, sort or copy applications. The automatic generation of control statements eliminates the possibility of syntax errors, the vendor said. Other functions include automatic data compression, special commands and a Help facility; the product allows the use of all other standard Syncsort features.

Online-Syncsort will be provided free of charge to existing Syncsort OS customers.

Syncsort, 50 Tice Blvd., CN18, Woodcliff Lake, N.J. 07675. 201-930-9700.

NEW PRODUCTS — SYSTEMS

Processors

Gould, Inc.'s Federal Systems Division has introduced the **Transportable Computer System**, the latest addition to its family of superminicomputer products for rugged environments.

Designed to meet military requirements for mobile Command, Control and Communications (C3I) applications, the product is said to be easily tranportable and housed in a watertight enclosure. Peripheral options include 150M- and 300M-byte Winchester disks, 640K-byte dual floppy drives and 120M-byte cartridge tape drives.

The product costs $90,000 for an entry-level configuration.

Gould Computer Systems Division, P.O. Box 409148, Fort Lauderdale, Fla. 33340. 305-587-2900.

Data storage

Archive Corp. announced that it has released Intel Corp. 80286- and 80386-based Xenix drivers that were jointly developed with Santa Cruz Operations, Inc. (SCO).

The drivers reportedly allow Archive's 60M-byte ST600/Fastape and 150M-byte ArchiveVP streaming tape drive products to operate with the SCO Xenix System V.

The **SCO Xenix** driver supports Archive tape controller Models SC499 and SC499R as well as the VP402 for IBM Personal Computer ATs and compatible machines.

The drivers are currently available from Archive and SCO at no charge.

Archive, 1650 Sunflower Ave., Costa Mesa, Calif. 92626. 714-641-0279.

I/O devices

Calcomp, Inc. has cut prices by almost 50% on its 24- and 36-in. 5700 series monochrome electrostatic plotters with 400 dot/in. resolution. At the same time, prices were lowered 8% for the 5700 series with 200 dot/in. resolution. The 200 dot/in. plotters were previously reduced by 39% in March.

According to the company, the price cuts were made as a move to expand the marketplace, strengthen alternative channel distribution and increase market share.

The new single-unit prices are $22,900 for 24-in. Models 5723 and 5725, which are 200 and 400 dot/in. respectively; and $27,500 for 36-in. Models 5733 and 5735, also 200 and 400 dot/in. respectively. All prices continue to include installation and a 90-day warranty.

Calcomp, 2411 W. LaPalma Ave., Anaheim, Calif. 92801. 714-821-2142.

Acurex Corp. has introduced the **MDAS 7000 Data Acquisition System**, a high-speed large channel-capacity unit designed for extensive process control applications.

The product is modular and can be configured for almost any application, the company claimed. There are more than 30 I/O cards that reportedly include standard analog and digital capabilities, plus anti-aliasing, thermocoupling, bridging, relay outputs and stepper motor control.

The three standard interfaces are RS-232, RS-422 and IEEE-488. The product is based on a Motorola, Inc. 68000 processor that operates at 10 MHz.

MDAS 7000 is priced from $3,000.

Acurex, Autodata Division, P.O. Box 7042, Mountain View, Calif. 94039. 415-967-9100.

Power supplies

Viteq Corp. has introduced a 1.5-kVA on-line uninterruptible power supply (UPS) unit that was designed to maximize wall outlet capacity.

Benchmark 15A will reportedly protect any minicomputer or other type of equipment load rated 12A or lower from all types of line disturbance, the vendor said. Input voltage fluctuating from 90V to 140V is accommodated, and reserve battery time is rated at 10 min under worst-case conditions.

The Benchmark 15A is priced from $1,795.

Viteq, 10000 Aerospace Road, Lanham, Md. 20706. 301-731-0400.

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BIMSPLIT — May be used separately or with BIMSPOOL to print parts of an existing job to terminal printers at separate sites. NEW

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BIM-PADS — Automatically alters or deletes DOS POWER spooled job entries at preset intervals. NEW

BIM-ODIS — Comprehensive problem analysis and display of operational CICS system. OBJECTRAK is an optional historical reporting feature to be used with BIM-ODIS to generate reports relating to system usage. DOS and OS. NEW

BIM-BUFF — Significantly increases the performance of VSAM under DOS by dynamically managing VSAM buffers. NEW

BIMTEXT — Word processing, document composition system. Create formatted documents from free-form input. DOS and OS.

BIMSWAP — Switch local 3270 BTAM terminals between multiple CICS partitions without special hardware or additional ports.

BIMCMPRS — CICS 3270 data compression system. Reduces response time for remote terminals significantly. DOS and OS.

BIM-PMAP — CICS BMS on-line map generation and maintenance. DOS and OS.

BIMSCRO — Copies one CRT's output to another or printer for problem determination and demonstration. DOS and OS.

BIMP3270 — Comprehensive CRT screen image print facility. Copy to terminal printers or spool queue for system printer. DOS and OS.

BIMSERV — On-line display of library directories and entries, VSAM Catalog entries, disk VTOC's, etc.

BIMCONSOL — Multiple/Remote System Console function for CICS. Display-only or full input/display versions available.

BIMSONTR — DOS/VSE System Status, Performance Measurement, and POWER Queue display.

BIMSUBMT — On-line Job Edit and Submission facility.

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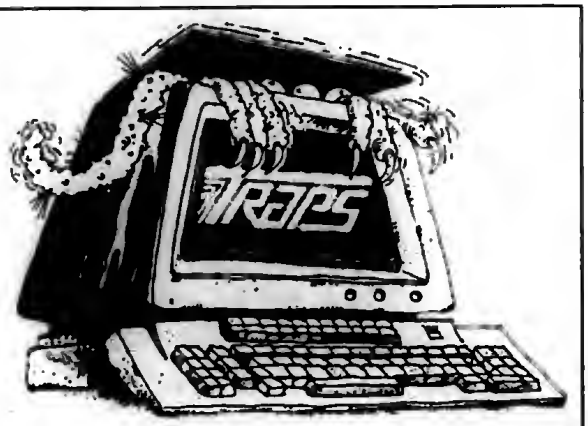

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TOO MUCH.

TOO LITTLE.

INTRODUCING MSR. THE NEW DATA INTERCHANGE STANDARD FOR MICRO TO MAINFRAME.

It has taken more than four years of development and millions in research. The collective thinking of the top minds in storage system design. And an engineering breakthrough from the world leader in removable data storage technology. But now, Cipher introduces the solution the industry has been waiting for. And it's revolutionizing the entire concept of data interchange.

Until now, most new products in the tape drive market have fallen into "too" categories. Too much. And too little.

Big, mainframe-compatible tape drives deliver high performance. But they come with an equally high price tag.

Low-end tape drives are small and inexpensive enough. They just don't pack enough punch to handle the needs of super micros and midrange systems.

What's been needed is a family of tape drives offering the performance, price and form factor required by low-end and midrange systems. Plus an economical means of interchanging data from low to high-end computers.

Cipher says, Touche.

MSR. The Driving Force.

It begins with a new standard recording format: MSR-Multi-track Serpentine Recording. Now for the first time data can be interchanged from micros to small mainframes with amazing new levels of performance and economy.

Cipher makes this possible with an all new family of MSR-compat-

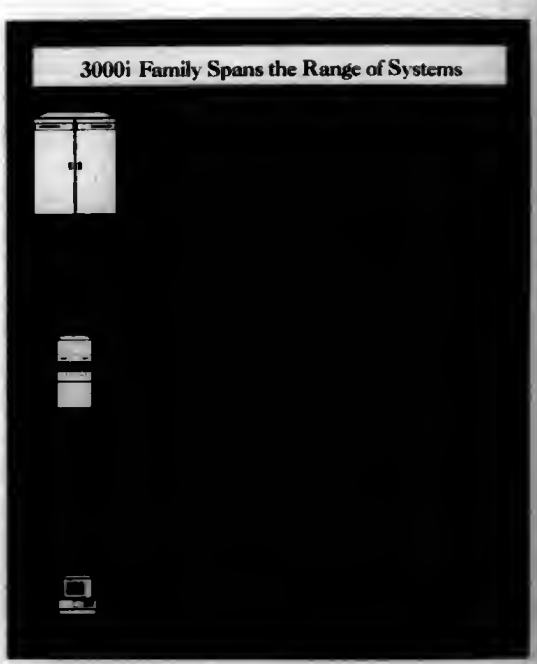
TOUCHÉ.

ible half-inch cartridge tape drives. The Cipher 3000i™ family. The biggest thing about them is their compact size. Compared to standard technology, they offer space saving benefits that are nothing short of phenomenal.

Using industry standard 3480-type cartridges the 3000i delivers a powerful backup solution and fills the void in today's interchange requirements. Each reliable 3480 cartridge provides a formatted capacity of up to 320 megabytes. In addition to its unbeatable low cost, the cartridge's compact size dramatically reduces storage space requirements. With the imminent development of increased capacity this media offers even more storage potential to come.

MSR uses a serial serpentine method to record data in groups of two or four tracks. This dual recording capability is the breakthrough that has allowed Cipher to meet the performance needs of the entire range of computer systems. Data integrity has also been greatly improved thanks to an advanced Reed-Solomon Error Correction Code (ECC). The result? An impressive read error rate of 1 in 10^{12} bytes.

Cipher's one and only focus is on removable data storage systems. No one offers Cipher's range of internal and external tape drive systems for backup and interchange with virtually any computer system. And no one is better poised to meet the development and integration needs of computer OEMs, value added resellers and end users alike. Now once again, Cipher sets the standard for tape technology.



INTRODUCING THE CIPHER 3000i FAMILY. THE WORLD'S FIRST MSR-COMPATIBLE HALF-INCH CARTRIDGE TAPE DRIVES.

The Cipher 3000i family is the first cost-effective, high performance solution for virtually any system size and configuration. There are 2 different series with more than 20 models. The series with an 8-inch form factor is the world's first tape drive system to address the size and high performance needs of workstations, midrange systems and small mainframes. The 5¼-inch form factor series will complement the economy and performance of micros and low-end minis.

What about backup speed? A high performance, GCR open reel drive takes 22 minutes and 4 reels of tape to backup a 500 megabyte disk. A Cipher 3000i drive, using only 2 cartridges, does the same job in half the time. This increased efficiency can mean substantial savings, potentially thousands of dollars in reduced system and personnel costs alone.

System integration couldn't be easier with a selection of interfaces including Cipher/Pertec, SCSI and IPI-3. A choice of configurations, too. Horizontal or vertical mounting, plus tabletop and 19-inch rack mount versions. And standard 9-track reel-to-reel commands ensure compatibility with existing system software, as well as protection of the enormous investment in software development.

Cipher 3000i drives are also setting new standards in operator convenience. Tape loading is automatic, just like a VCR. Tape path cleaning is quick and easy using a 3480-type cleaning cartridge. And all models feature powerful diagnostics that are automatically executed at "power on" and during normal on-line operations.

cipher 3000i

Innovation by Design.

Cipher's advanced modular design reduces power and cooling requirements. Brushless reel motors and extensive use of CMOS VLSI circuits dramatically enhance device reliability. With engineering like this it's no wonder the 3000i delivers an impressive MTBF of 15,000 hours.

Never has such an incredible range of power, performance and economy been available from a single line of tape drives. And never has the potential been stronger for the evolution of new, higher performance products for future generation systems.

The 3000i family is the latest in a long series of Cipher innovations. Cipher ½" reel-to-reel tape systems have set the standard by which others are compared. Cipher also leads the way in ¼" streaming cartridge systems and optical disk drives. Plus new innovations in subsystems and interfaces, including SCSI-2 technology.

Supported by the full resources of an international service and spares network, the 3000i family is destined to forever change the concept of data interchange. But then, would you expect anything less from the world's leading independent removable data storage systems company.

Touche.

For more information on MSR and the 3000i Family contact Cipher today.

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After all, 1-2-3 Release 2.01 has recently been rated the top-performing spreadsheet for an unprecedented fifth straight year by the NSTL.[2] In fact, 1-2-3 is the backbone of business, with over 7 million users who depend on it everyday.

Plus, the upcoming 1-2-3 Release 3[3] will be the most powerful spreadsheet on the market by far, yet it will offer the familiar 1-2-3 interface and be fully compatible with all your present 1-2-3 data, macros and applications.

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(1) Upgrade offer valid September 6, 1988 through 30 days after the 1-2-3 Release 3 ship date. (2) National Software Testing Laboratories, Inc. Software Digest Ratings Report, June, 1988
(3) 1-2-3 system requirements will vary from Release 2.01 to Release 3. 1-2-3 Release 3 runs under DOS and OS/2, Hard disk and 640K required. Lotus certified compatible PC with 80286 processor or better recommended.
Lotus and 1-2-3 are registered trademarks of Lotus Development Corp. dBase is a registered trademark of Ashton-Tate Corporation

MICRO BITS

Douglas Barney

Users' tastes still pricey

Where's that cheap software? A few years ago, things were looking up for software customers. That was about the time industry pioneer Adam Osborne made a bold prediction. He said that software prices would fall so fast and so hard that no one would pay more than $100 for a top-notch program. Analysts galore backed Osborne, and it looked like we had a real trend on our hands.

There were a number of companies that tried their best to prove Osborne right. Aggressive companies such as DAC Software turned the accounting software market on its ear with a hot-selling $69 package. Things sure looked promising, especially after DAC sold more modules than all of its competitors combined.

At about that time, lots of other good, cheap software hit the market. Osborne himself cranked out a cheap spreadsheet program, which, in some ways, Lotus is still struggling to catch up with, and Borland was trouncing other language vendors with cut-rate quality packages. With an avalanche of

Continued on page 48

PCs fast as rabbits

AST, IBM, Everex sparkle in OS/2 run tests

BY DOUGLAS BARNEY
CW STAFF

PHILADELPHIA — It's not too tough to find out which personal computers are the fastest when it comes to today's popular software packages. Benchmarks abound that compare IBM with Compaq Computer Corp., Hewlett-Packard Co. and whatever else happens to be around.

But to find out which machines run tomorrow's software the fastest, either read this article or call National Software Testing Laboratories (NSTL). This venerable benchmarking outfit put several PCs through their paces to find out which runs OS/2 applications the fastest.

In four of the seven OS/2 tests for Intel Corp. 80286-based systems, the AST Research, Inc. Premium/286 cleaned up.

However, when running Microrim, Inc.'s R:Base for OS/2, the IBM Personal System/2 Model 50-061 came in first, with the AST Premium/286, the IBM PS/2 Model 50-031 and the Compaq Deskpro 286 Model 12 following in that order.

In fact, the Compaq machine, which is being deemphasized by the company, came in last in all seven OS/2 benchmarks.

IBM for 25 MHz

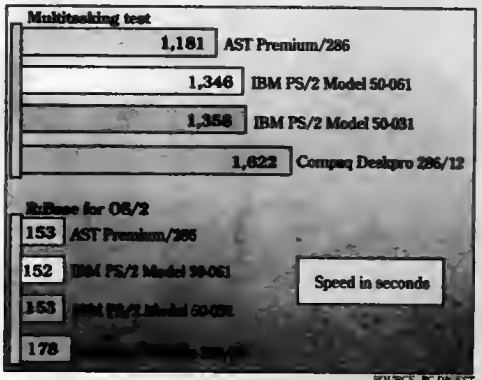
For the speedier 25-MHz Intel 80386 systems, IBM's Model 70-A21 took top honors, with Compaq's Deskpro 386 Model 25 coming in close behind.

It was a different story for 20-MHz 80386-machines. Here, the Everex Systems, Inc. Step 386/20 took top honors in four of the six OS/2 benchmarks. The Dell Computer Corp. System 310 was the fastest running IBM's Displaywrite 4/2, and the AST Flexchache 20386 was the fastest running R:Base for OS/2.

Continued on page 49

OS/2 performance tests

Results for R:Base and a multitasking test running on four OS/2 machines



SOURCE: PC DIGEST
CW CHART

Enable upgrade allows multiprocessing tasks

BY STEPHEN JONES
CW STAFF

BALLSTON LAKE, N.Y. — The Software Group upgraded its Enable high-end integrated software application last week, adding multitasking capabilities that can be run on Microsoft Corp.'s MS-DOS, IBM's OS/2, Unix and other operating systems.

The multitasking features allow users to tap into one of Enable/OA's five applications modules through interrupt processing, time slicing and polling. Enable/OA's multitasking capabilities were designed to let a user write a report with the word processor while running spreadsheet recalculations in the background that may be sent to another office through a telecommunications module, compa

Continued on page 48

TI crashes party of info managers

BY ALAN J. RYAN
CW STAFF

HOUSTON — While the jury is still out on whether users need programs to manage personal information such as address books and phone numbers, vendors keep hopping on the bandwagon.

Last week, TI-Express, a group within the Houston-based customer service division of Texas Instruments, Inc.'s Data Systems Group, jumped into the fray. The low-profile software organization announced Performance Plus software to assist users in performing tasks such as

Continued on page 42

Inside

- PCs find those cyclists. Page 39.
- Whyte's White challenges the Micro Channel. Page 39.
- Vermont Microsystems brings graphics to IBM PCs. Page 51.

As Competition Gets Tough... A Top Insurer Gets Tougher with Help from Micro Focus COBOL/2 Workbench

At Continental Insurance, Assistant Vice President Roy German delivers information systems that help Continental stay on top in a market that keeps getting tougher. When Continental needed a complete insurance rate quote system in just 90 days, he knew where to go for help... Micro Focus.

"We had to get the system up fast, so we did it on a PC. With the Micro Focus COBOL/2 Workbench, two programmers were able to develop the entire rate quote system in time to meet the deadline," says German.

A system delivered on time and within budget. That's what every MIS executive wants. That's what Continental got with the Micro Focus COBOL/2 Workbench. So, it's not surprising that Micro Focus Workbench tools have become a major part of German's future application development strategy.

Migrating mainframe code to programmer workstations. Debugging code faster than ever with the Micro Focus ANIMATOR.™ Developing CICS applications at the PC. Exploiting the power of Workbench's IMS testing and emulation system. Continental programmers are doing it all with the Micro Focus COBOL/2 Workbench.

For Roy German, it comes down to this. "I was happy with the COBOL/2 Workbench the first time I saw it work and now I've established all of my PC development efforts around Micro Focus."

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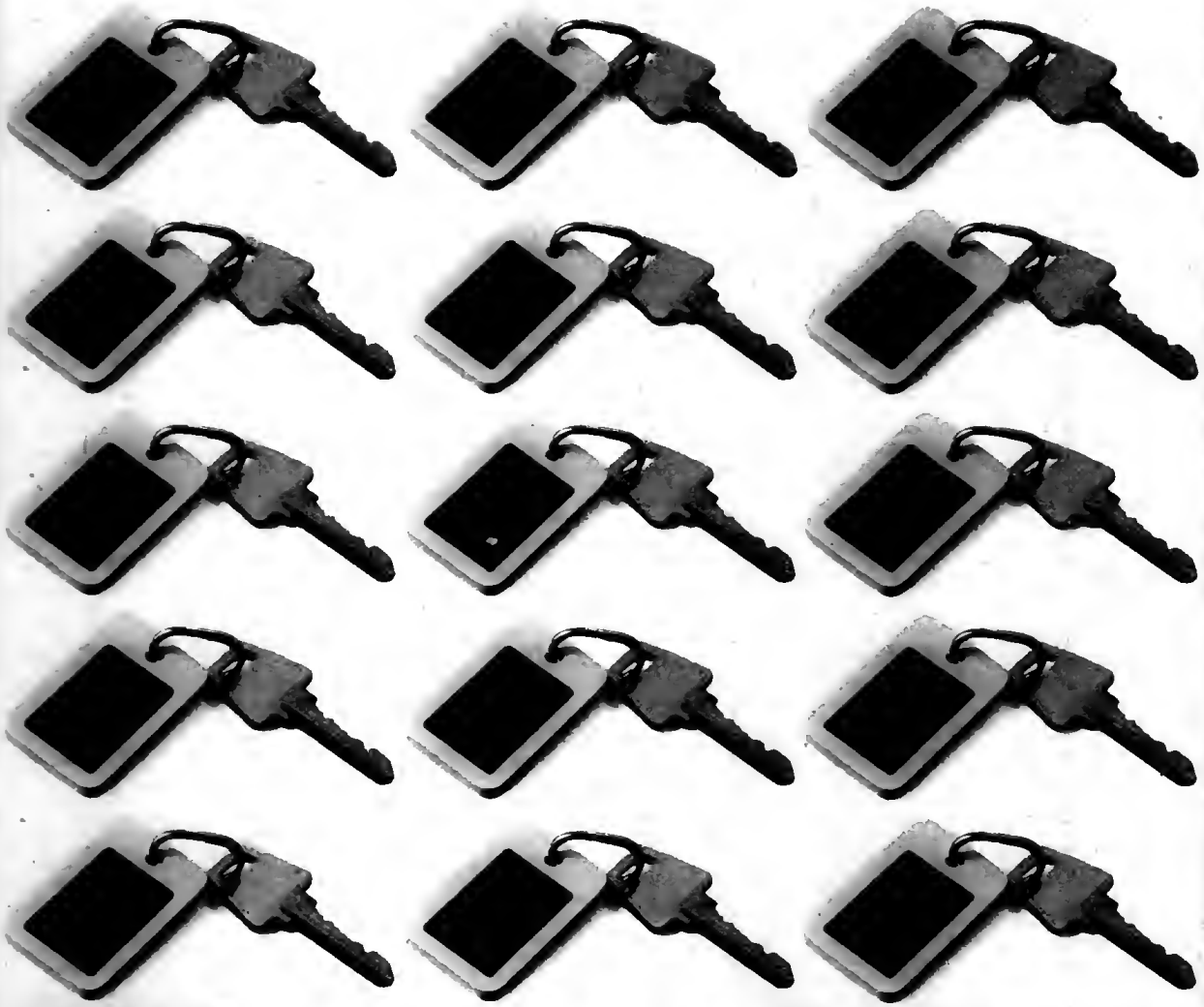

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Mr. Robert C. Seate
Manager, Management Information Systems
Best Western International, Inc.

"With SUPRA, we really have the best of both worlds," explains Seate. "We get the advantages of a relational environment and, at the same time, get a system that performs very well in a large volume production environment."

SUPRA's superior performance lets the world's largest hotel chain access and update the marketing data as well as the property and travel publications essential to support and promote each hotel. SUPRA also works in concert with MANTIS®, a flexible application development tool in the CASE ENVIRONMENT™, to drive multiple programs designed to monitor and upgrade quality standards throughout the Best Western organization. "When you increase the value of the chain, people want to become a part of it," Seate explained.

"SUPRA and all the Cincom products work together to help us meet our corporate expansion and quality goals," Seate points out. "It's a set of tools that is very flexible, very easy to use and learn, and very capable of developing and supporting a wide variety of applications."

As for SUPRA's reliability, Seate has no reservations. "Let's put it this way," he says, "we're running our payroll on it. We'd be crazy to do that if we didn't have a high degree of confidence in the system."

If you're looking for a relational data base with IBM and VAX compatibility, high performance and reliability, plus the option of a flexible application development tool, it's time you checked into SUPRA and MANTIS.

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SMALL TALK

William Zachmann

MCA hits the flophouse

IBM announced its Personal System/2 and OS/2 18 months ago on April 2, 1987. At the time, anyone who would have predicted that a year and a half later IBM would be introducing an Intel 80286-based system with AT-compatible slots on the same day that virtually the rest of the industry announced agreement on a backward-compatible 32-bit extension of the AT bus would probably have been placed in a straitjacket and promptly carted away by attendants in white coats.

Events that actually occurred on Sept. 13 are a tribute to the fascinating unpredictability of the industry as well as an example of how far IBM has fallen. For, contrary to nearly everybody's expectations, IBM's proprietary Micro Channel Architecture (MCA) has clearly failed to define a new standard for personal computer architectures.

The key imperative of IBM's PS/2 strategy was to eliminate or at least drastically reduce competition from compatible vendors. MCA was the central element of that strategy.

Protected by IBM patents and linked to the company's planned OS/2 Extended Edition operating system, the architecture was intended to crip-

Continued on page 44

The other side of the mountain

Former IBMer White leads Wyse into challenge of Micro Channel

IN PERSON

In the battle between IBM and its competitors over standards, ex-IBM exec Phillip E. White, now president of Wyse Technology, Inc., has been on both sides of the firing line.

For 16 years at IBM, White held a number of sales and marketing posts, his last being director of planning in the communications products division. The stamp of that experience still shows when he refers to joining Wyse as entering the "outside world." Now White's company has united with a group of IBM competitors to assert its own standard in the personal computer bus arena.

Computerworld West Coast correspondent Julie Pitta spoke with White shortly after Wyse joined with Compaq Computer Corp. and other firms to announce the Extended Industry Standard Architecture (EISA).

What's the importance of this alliance?

I think it's the first time that anyone has challenged IBM to reestablish a standard. They established standards with the PC XT and AT bus, and then they tried to close it with the Micro Channel. Users really came to all of us, saying, "There has to be a better way." At the same time, we didn't see the Micro Channel taking off in the market. We wanted to find a way to build a 32-bit bus on the AT. Instead of killing ourselves, we all thought, "Let's decide on one."

How did the alliance come about?

Over a long period of time, [Zenith Data Systems Corp. President] John Frank, [Tandy Corp. President] John Roach and I had talked and tried to come up with a specification based on our different designs. We obviously needed Compaq, Intel and Mi-

Continued on page 42

White *has been on both sides of the firing line*

Image DB captivates users

BY ALAN J. RYAN
CW STAFF

BALA CYNWYD, Pa. — From checking mug shots of defendants prior to urinalysis tests to cataloging the works of the Smithsonian Institution's Hirshhorn Museum, Pictureware, Inc.'s Picturepower database system is being put to the test in incredibly diverse areas.

The system, which is compatible with Ashton-Tate Corp.'s Dbase III, allows users to incorporate photographic-quality pictures into databases being used for factory-quality control, parts inventory, signature verification, real estate and even medical fields.

One user, Transamerican Medical Referrals in Miami, has created an international medical access program using Picturepower running on Dell Computer Corp.'s PC's Limited 286 machines with 1M byte of memory, according to Dr. Sederico Meithe, director of medical systems analysis.

Meithe's application involves a console with the personal computer, a videocassette recorder, a microscope, an X-ray view box, a printer, a facsimile machine, a video camera and a mouse.

Meithe said his company configures the console setup and sells it for $43,500, which includes training. Currently, there are two outside offices, one in Honduras and another in Ecuador. A third will be opening soon in Colombia. Users in those countries can input a patient's medical history, X-rays, mammograms, pathological slides, electrocardiograms and more into the system.

According to Meithe, the information is transmitted via modem to Transamerican Medical, and U.S.-based physicians can look at it to provide diagnostic impressions for the patients. Meithe said that for a South American patient, the diagnostic impressions could include a videotaped transmitted message recommending treatment that

Continued on page 49

Picturepower 1.6; Picturepower HC

Price: $945; $3,900

- Requires 640K bytes of main memory with a hard disk and MS-DOS 2.0 or higher.
- Requires capture/display board, analog RGB monitor (or composite monitor for Picturepower 1.6), video camera and mouse

SOFT TIPS

Avoid memory crunch

Memory constraints under MS-DOS are a problem for many users, particularly those running large worksheets with Lotus' 1-2-3. If you are using 1-2-3 and the available conventional memory is close to or below 5% (select /Worksheet Status), avoid using the /System command.

The program used to execute /System is run in conventional memory. If available conventional memory is low, you may get an "insufficient memory" message when you try to return to 1-2-3.

Information provided by Corporate Software, Inc., a Westwood, Mass.-based software reseller.

PC chases wheels across America

BY DOUGLAS BARNEY
CW STAFF

Austrian Franz Spilauer was on a bicycle somewhere in Colorado, still riding smoothly in the nearly nonstop Race Across America. But since the bike race's 82 time stations are as many as 50 miles apart, it was impossible to know exactly where Spilauer and the 38 other sweaty and, some say, crazy entrants were.

Tracking riders such as Spilauer was largely guesswork in 1982, when the race was formed by John Marino, a former Los Angeles Dodgers catching prospect whose career were cut short by a weight-lifting accident. Guesswork and hunches are not a good method for a race that covers 3,073 miles in a little more than nine days.

Not only does the Race Across America test the limits of human resolve, it also runs through every type of weather and terrain imaginable. Average speeds for average conditions have no meaning here.

Race tracker

So how do you know where Franz Spilauer is after enduring more than 1,000 miles of desert heat and mountains and with precious little sleep?

Just ask computer whiz Randy Evans, that's how. Evans may not have been able to pinpoint Spilauer's precise location, but he could give a darn good guess with the help of an Apple Computer, Inc. Apple II clone and a custom-written program.

Evans, who works for the Santa Ana (Calif.) Redevelopment Division, spent 12 years programming Hewlett-Packard Co. minicomputers in Basic. This training helped Evans win his own race against the clock; he did not begin coding the program until the day before he left for the start of the bicycle race.

The problem Evans faced was estimating the average speed of riders who were suffering from sleep deprivation, the constant rigors of changing weather and physical obstacles such as the 11,307-ft-high Berthoud Pass in Colorado.

For whom the miles toll

Taking data from previous races, Evans factored in the riders' rate of physical decay as the miles took their toll and the effects of the Kansas plains and Rocky Mountains had their impact on average speed. Where riders may start out zipping along at 20 miles per hour, that can easily be cut in half by the end of the race.

Just who cares where these riders are? Race fans and the sports press, who call a 900 number for the latest standings, care. Friends anxious to cheer riders on and those manning the checkpoints tend to care even more about Evans' estimates.

Some people would prefer that race officials keep their data to themselves.

Officials figured that it was mathematically impossible for three struggling riders to squeeze in under the cutoff point and asked the riders to stop. It is simply too difficult to speed up after riding 2,500 or so miles in less than two weeks.

But try explaining that to someone who has spent not months, but years, training for what some consider the ultimate cycling achievement.

Actually, the riders know where they are better than Evans does. You see, most riders have their own tiny computers that tell them how far they have gone and how long it took them to get there.

Racing *with the wind*

We've Installed 7,500 What More Is

In this, the fourth consecutive "Year of the LAN," anyone can sell you networking equipment. And will.

But what most companies need is someone experienced in the design and installation of multivendor networks. An objective source to integrate all the different technologies of different companies to work for you.

Which is a very good description of Businessland.®

WE'VE SEEN IT ALL.

If this is your first time, networking is a new and exciting idea.

Unfortunately, it's still something of an adventure for a lot of the companies out there doing it.

Having designed, installed and supported well over 7,500 different networks, Businessland has seen and done it all. More than a few times.

WE BRING ALL THE BEST COMPUTER COMPANIES TOGETHER.

Early on, before LANs were popular, Businessland was working closely with our customers, and the major hardware and software companies as an advocate of multivendor solutions.

These ongoing relationships, combined with our technical and service resources give us unique experience and perspectives in connecting these products. Something most VARs or networking companies lack.

To the point where today, we're installing and maintaining an additional 400 multivendor networks and 4,000 nodes each month for businesses across the country. For smaller businesses as well as Fortune 500 corporations.

WE'LL SHOW YOU HOW.

A lot of people have delayed the decision to connect their PCs. And frankly, we don't blame them. No one has shown them, in terms relating to their business, how they should go about it. How it will benefit business. And how to overcome the perceived risks.

We would like to have the opportunity to do that.

WE COULD WRITE A BOOK ABOUT YOUR NETWORK.

If you're up nights over this decision, we recommend our Expert LAN Planner. Even if you don't sleep better, at least you'll have something good to read while you're up.

Expert LAN Planner is a very affordable and popular first step. For less than $400, you will receive a workbook that helps you identify your needs. Then a systems engineer will come to your office, ask questions, observe your operation and put together a book describing the best LAN for you. Including all the specs on hardware and software. And the price, should you choose Businessland to install it.

You'll finally have a good idea of what you're in for.

WE PROVIDE A COMPLETE SUPPORT SYSTEM FOR YOUR LAN AND YOU.

While a network can make incredible things happen for your business, it does demand some attention in return.

Our Gold Plan gives every LAN a support organization of its own. This includes your own Businessland account manager, systems engineer, field service technicians, trainers and corporate technical support. Starting with the pre-networking consultation right through installation, our ongoing support includes remote diagnosis, an 800 phone number called SolutionLine,™ on-site consulting and regular reviews to assure your network performance.

Multivendor Networks. There To Say?

WE EVEN PUT A SERVICE CENTER ON YOUR DESK.

Our new ServiceLine™ 800 number lets you pick up the phone and immediately access our combined local and national service resources. We can solve a lot of your problems right over the phone. Otherwise, we'll immediately dispatch our local technicians to your office location.

From nearly 100 centers, Businessland has built a major national service organization. With our own fully automated national parts distribution system and field proven service technicians, Businessland will service microcomputers, peripherals and networks on an as needed or contract basis.

WE'LL CONNECT YOU TO YOUR MINIS AND MAINFRAMES.

Local Area Networking is just the beginning of office connectivity.

For many larger operations, integrating the minis and the mainframes is an additional requirement. LAN to mainframe connections offer a whole new set of issues. To help you deal with them, Businessland has experience with the industry's most effective solutions.

WE'VE LEARNED FROM OUR EXPERIENCE. SO SHOULD YOU.

When it comes to preparing business people to get the most out of their computers, our Businessland educational programs are among the most popular in the business.

Thousands of application classes and custom tailored training programs help employees use their computers to reach their performance potential in their specific jobs.

To help MIS managers develop informed connectivity strategies for their companies, we feature conferences and advanced seminars. Including regular connectivity conferences that regularly bring together the presidents and CEOs of the top hardware and software companies.

Hundreds of other seminars are held nationally to prepare department heads and smaller businesses for a productive networking experience.

WE WON'T DO ANYTHING TO YOU WE HAVEN'T ALREADY DONE TO OURSELVES.

No one has gone farther than Businessland to take the risk out of networking.

First, we run trials, tests and evaluations on all available networking technology. Before we'll use it. That way we know what works, what works with what, and what may work now but might not later.

Second, we run our own business operations through 130 interconnected LANs we've installed across the country and England. Which makes us one of the most heavily networked companies in the world. So we not only know how to install and maintain networks, we know how networking can affect your business. Measured in sales per employee, our productivity increased 40% last year alone.

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Other side

CONTINUED FROM PAGE 39

crosoft behind this. We needed to have the industry leaders behind this. Without them, it would be impossible. But it's not just a Compaq and Intel spec. If it was, we couldn't join up.

With Extended Industry Standard Architecture, the playing field will be equal. Anybody will have an equal chance to build a product. A spec for EISA will be published shortly. There isn't one for Micro Channel.

Why join with your competitors?
I couldn't get other board and software companies to build products to meet my standard. We had to have the industry behind us. It's important that we all band together and come up with a spec and give it to everybody.

Has Wyse abandoned its plans to clone the Micro Channel?
We continue to have a Micro Channel engineering plan under way. Will we announce it? That depends on what our resellers want. We could announce a Micro Channel machine late this year or early next year.

Has IBM been asked to join?
Several people have talked to IBM about joining, but they have declined. IBM has lost market share with the Micro Channel. They've been a leader in establishing another consortium for industry standards — OSF [the Open Software Foundation]. It would be foolish for them not to join.

What will IBM do? That's the $64,000 question. We should know more in the next two or three months.

> "WITH EXTENDED Industry Standard Architecture, the playing field will be equal. Anybody will have an equal chance to build a product."
>
> PHILLIP WHITE
> WYSE TECHNOLOGY

You said you don't see Micro Channel going anywhere. Why hasn't it?
For the first time, IBM took what was a standard and tried to close it. They believed they could make that work, and it hasn't. They've had some success, obviously — they've shipped millions of it. But we all have shipped much more of the AT bus. IBM's hand got called.

It's too early to call it a failure. That's why we aren't canceling our Micro Channel development effort.

We want to build whatever takes off as a standard.

Although it has had a somewhat slow start, industry analysts have said that IBM's Micro Channel Architecture will become the next industry standard. Why fight it?
I won't fight it, if it becomes the standard. The success we've had in shipping AT-bus machines since the PS/2 was introduced is proof enough that customers want an alternative.

How big is your investment?
It will be equal to our MCA effort. But it won't take as long.

Compare the Extended Industry Standard with the Micro Channel. What are the benefits of each of these?
The biggest benefit of EISA is total compatibility with the XT and AT. That far outweighs anything else. We think EISA has a little faster bus rate than the Micro Channel. The biggest plus for Micro Channel is that it's available today. But I'd add as a caveat that I don't see any application environment that currently outruns the current AT bus.

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INNOVATIVE, EFFICIENT DESIGN

Here at Quadram, we drew on our years of computer enhancement experience to implement the latest advances in microprocessor and custom chip technology. That let us slash the number of components on the board, cut our costs, and give you access to both major PC-to-mainframe emulation standards at such a modest price. The innovative board also draws less power and runs cooler, which boosts reliability.

MainLink II's half-card size means you can install it in any laptop PC—such as the Datavue® SNAP™—that accepts add-on boards. You can turn that PC into a truly portable terminal. The half card also saves precious space inside the case of desktop and "luggable" PCs.

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To assure continued compatibility, MainLink II's design allows for soft-loaded microcode. This means future features and enhancements can be added with just a diskette.

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Devices Emulated	3278/79 3287	3278/79 3287	3278/79 3287
IRMA Compatible	●	●	
IBM Compatible	●		●
Soft Loaded Microcode	●	●	
Power on Self Test	●		
PC/XT/AT/PS2 Compatible	●	●	●
3174, 3274 Supported	●	●	●
Emulation and IBM IND$ File Transfer	●	●	●
Microchannel Available	●	●	●
Price	*$545	#$1,294	+$1,020

* MLII-E $545.00 MLII-EM Micro Channel Version $645.00 MLII $495.00 No Software MLII-M $695.00 No Software

\# IRMA2 $1,196.00 + $99.00 for IND$ File Transfer Support

\+ IBM Board is $995.00 and Version 2.0/3.0 Software is $625.00

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TI out

CONTINUED FROM PAGE 37

keeping track of schedules and appointments, maintaining a name book, calculating, looking up and dialing phone numbers and retrieving reference information like time zones, state capitals, zip codes and area codes.

In addition, like Microsoft Corp. MS-DOS shells, the package can make opening programs and managing files and directories easier.

According to the vendor, the package will sell for $129 and was designed to work with TI, IBM and compatible computers.

While working in another application program, the Performance Plus user will reportedly be able to access 10 functions, including Calculator, Help, Quick Notes, Reminder, Ruler, Show, Print and Name Finder, without having to leave the other program. All of the functions are icon-selectable and can be initiated with one or two keystrokes, TI said.

Other functions include a file editor, a screen manipulation program, octal and hexadecimal file displays and a screen-capture utility.

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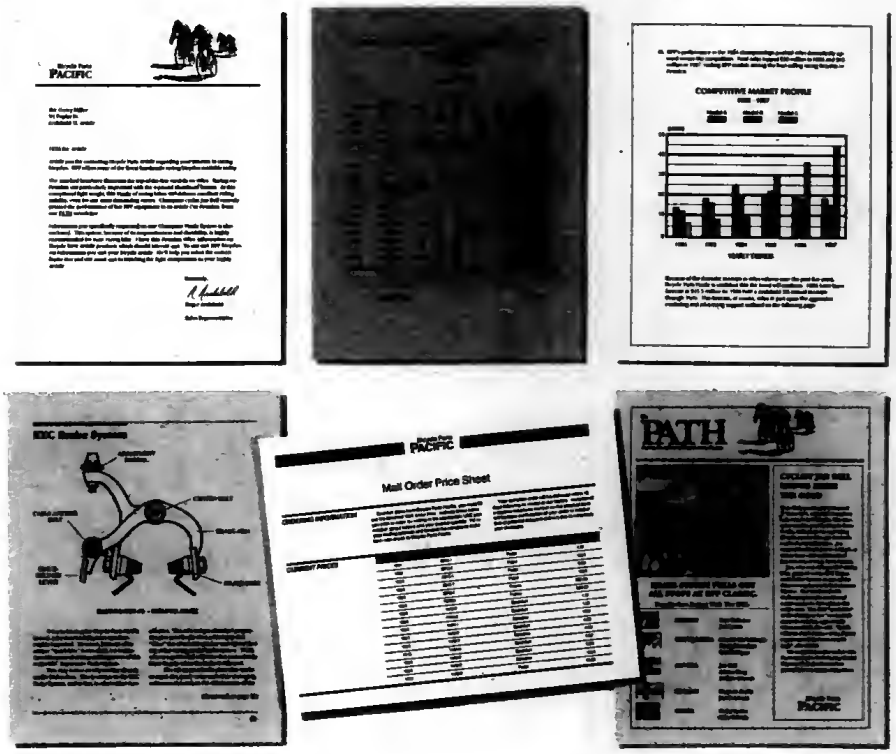

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HEWLETT PACKARD

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Print samples were created using Microsoft Word, Microsoft Excel, and Aldus PageMaker.

Zachmann

FROM PAGE 39

ple other vendors' ability to compete by offering compatible systems at lower prices.

IBM deliberately cut off the supply of AT-bus machines as quickly as inventories could be depleted following the announcement of the PS/2. IBM wasn't at all interested in giving customers what they wanted.

Despite continued demand for AT-bus machines, IBM forced buyers who wanted more-capable 286- or 386-based systems to purchase MCA, confident that users could be herded back into IBM's proprietary MCA corral.

At the same time, IBM was happy to let everyone indulge in the illusion that MCA-compatible systems would appear just as IBM Personal Computer and PC XT and AT compatibles had appeared. Even though IBM had every intention of making it impossible for other vendors to profitably make and sell MCA-compatible systems, the company held off, aggressively asserting its "intellectual property rights" while attempting to get users committed to its MCA machines.

It wasn't until semiconductor vendors started providing silicon to enable competitors to build MCA-bus systems this spring that IBM put the hammer down by raising patent royalties 500% and demanding retroactive payments from compatible vendors. The result was that even vendors who had already announced their intent to build MCA-compatible systems backed off. The reality is that IBM's licensing fees required that compatible vendors hand over most of their potential profits to IBM.

Fatal flaw

IBM's grand strategy to regain control of the PC market had one very important and ultimately fatal flaw, however. Simply put, it was that despite all the hype, in reality, MCA offers absolutely no significant advantages either in performance or in functional capability over compatible extensions of the AT bus. Compaq, AST, Dell, Everex and numerous others have built AT-bus systems that easily perform as well and often significantly better than the PS/2 with the MCA bus.

Since MCA also has the disadvantage of total incompatibility with hundreds of millions of dollars worth of AT-bus add-in cards already in use, lots of smart users have preferred to buy AT bus-compatible systems over nonstandard MCA PS/2 models. The result has been that IBM has continued to lose market share since the PS/2 introduction.

> IBM'S licensing fees required that compatible vendors hand over most of their potential profits to IBM.

That IBM should be reduced to reintroducing an AT-bus machine in a last-ditch effort to reclaim money left on the table for competitors is an indication of the problems in its effort to force users in the direction of its new proprietary "standard." Despite IBM's quixotic public relations efforts to convince users to the contrary, its new AT-bus system is a desperate drive for short-term revenue over the longer range, and flagging, proprietary MCA strategy.

That IBM's competitors should simultaneously agree on a 32-bit extension of the AT bus that provides upward compatibility and all the function and performance of MCA, however, very likely spells nearly complete failure for IBM's proprietary effort. Users have already been buying more "industry-standard architecture" systems than they have IBM proprietary MCA systems, even without agreement on a 32-bit standard extension. Now that such agreement has been accomplished, users will find it even easier to ignore IBM's proprietary standard.

Zachmann is a senior vice-president at International Data Corp.

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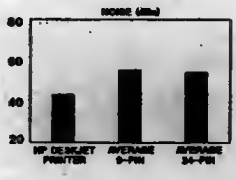

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Barney

CONTINUED FROM PAGE 37

shareware and freeware programs, the supply of cheap software kept growing.

But even though these packages are capable as well as cheap, hardly anyone seems to be buying. Nor have they driven down the prices of market-leading packages, as Osborne had predicted. Instead, users continue to shell out hard-earned bucks for top-dollar software. Lotus' 1-2-3 still lists for $495, and Ashton-Tate's Dbase costs even more.

Also, Borland has been steadily moving away from cheap software in hopes of making more bucks selling the expensive stuff. All this comes in the face of hardware prices that until recently had fallen like stones.

With OS/2 and the Presentation Manager looming as a high-cost blot on the horizon, prices may only get higher.

What's worse, they may never get better.

Around this time, you've got to be asking, how can the vendors get away with this stuff? Isn't the customer king? Well, it is King Customer that let this happen in the first place. For some reason, customers like name brands. Instead of buying a $6 bottle of generic Scotch whisky, most consumers will opt for something distilled in Scotland.

But there is more to it than that. Unlike scotch, which you drink and forget about (particularly if you drink a lot), software is used over and over again. Like anything that gets that kind of use, problems are likely to occur. Besides, software is a lot more complicated than scotch.

Because users expect problems with software, they tend to choose packages with a lot of users who have pounded on the stuff and vendors that seem able to support and enhance the product. So why not pay a bit more for software if it means fewer headaches?

There may be fewer headaches, but a lot of great software will be ignored. And software will never get cheaper until these customer attitudes change or until sellers of cheap software grow larger, more stable and more trustworthy. But until customers pressure these vendors with their 25% profit margins, the hope for cheap software will continue to fade.

Caution: Bad jokes ahead. Anytime a comedian takes the stage, there is a certain element of risk. But hey, these guys are pros. Imagine, then, how much risk there is to a lowly computer journalist scrounging for yuks. The failure rate has got to be appalling. Let's try a computer joke anyway.

Q: Why did the bar chart cross the screen?

A: To show 100% growth.

Some may be kind enough to call this a joke. I call it punishment for reading to the end of this column. If you think you can do better, call or write, and maybe we can all groan at you too.

By the way, a vendor's PR stooge recently asked me if I had ever covered printers. "Sure," I said. "But only peripherally." Oops. That's strike two!

Barney is a *Computerworld* senior editor, microcomputing.

Enable

CONTINUED FROM PAGE 37

ny officials said.

Designed for multiuser work groups, Enable/OA allows its users to look at and transfer data from any application within the system. Featuring a version with built-in local-area network hooks, the software supports such networks as Novell, Inc.'a Advanced Netware, IBM's Personal Computer Network Program, AT&T's Starlan and 3Com Corp.'s 3Plus.

Competition strikes again

Competition is expected to take off in the multiuser market as OS/2, with all of its advanced capabilities, begins to squeeze out other developers.

But The Software Group spokesmen countered that Enable has a chance against the multiuser, multitasking OS/2 because Enable/OA offers a variety of applications with one consistent set of commands and menus.

OS/2, on the other hand, runs applications from a variety of developers with no consistent set of commands.

The LAN version and the basic Enable/OA system are slated to be available by the end of October. The LAN package starts at $1,495, depending on configuration. Enable/OA costs $695.

Users will be able to read more file formats into the Enable upgrade, which includes support for Wordperfect Corp's Wordperfect and Samna Corp.'s Samna formats, the vendor said.

The software already reads files from such programs as Ashton-Tate Corp.'s Dbase and Lotus Development Corp.'s 1-2-3, according to The Software Group spokesmen.

The application modules included in Enable/OA also received an enhancement. The size of the relational database management system increased from 64,000 records to more than one billion. The spreadsheet application has grown to 1,024 columns by 9,999 rows, which represents more than 10 million individual cells.

A separate module featuring a three-dimensional spreadsheet with multiple levels will be available in the fourth quarter. Users who purchase Enable/OA will be able to upgrade to the new spreadsheet free of charge, according to the spokesmen.

Can your async network pass this simple test?

Image DB

CONTINUED FROM PAGE 39

could be done in his country or a recommendation that the patient be brought to the U.S. for treatment.

The medical referral group has been using Picturepower for 10 months with no problems, Meithe said.

At the D.C. Pretrial Services Agency in Washington, D.C., the picture database is being used prior to medical testing, but in this case, those being tested are either adult or juvenile offenders.

According to Johnny Jordan, director of the drug detection and monitoring program at the agency, the database is used to photograph and keep track of criminal defendants ordered to be monitored for drug use through urinalysis. Because people have tried to beat the system in the past by sending someone in their stead to undergo the drug testing, Picturepower allows the agency to be certain it is testing the correct people.

The only problem, Jordan said, is that occasionally a photo is lost within the system. With close to 3,000 files, Jordan said losing a photo can be frustrating. "If we figure out that it is caused by human error as opposed to a program error, I would feel better," he said. "But right now, we think it is a program error."

Jordan noted that the lost photos have occurred often enough to become a concern within the agency.

"We are not aware of any problem with losing pictures with any version we have shipped since January," a company spokesman said. Pictureware advises the user to upgrade.

In another part of Washington, the Hirshhorn Museum is using Picturepower HC to catalog its 13,000 artworks. The HC version reportedly allows for an average of a 10-to-1 compression of image size, reducing storage requirements and transmission times.

Picturepower, a computer photo album

With so many pieces in its permanent collection, the museum's database will help it to keep track of which items are on display and which are stored or on loan to other museums.

According to James Mahoney, museum registrar, the entire collection is stored on a Smithsonian mainframe-based database. That information can be downloaded to a Dbase format and used within the Hirshhorn Museum. Artwork is photographed and the image is run through a digitizer and a compression board. The image is then stored with a skeletal amount of identifying data that will eventually be linked to the entire database.

"Effectively, it is pretty simple and it does exactly the job we want," Mahoney said. However, be noted, building the database will take more than two years. He said the most appealing aspect of the program is that it is interactive. "We can work on it day to day without outside help," he said.

Simple Test

1. Does your network provide for both *wide area* and local users? Yes__ No__

2. Does your network support point-to-point, multi-point and *Ethernet*® configurations? Yes__ No__

3. Is your network able to talk *synchronous* when necessary? Yes__ No__

4. Can you *easily* add users, nodes and new applications? Yes__ No__

5. Can your network *recover* from a disaster on its own? Yes__ No__

6. Does your *network management* maximize performance and control? Yes__ No__

What your score means:
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Fast as rabbits

CONTINUED FROM PAGE 37

The OS/2 benchmarks use larger files than DOS benchmarks and can also gauge the performance of systems running multiple concurrent tasks.

Both of these capabilities will become critical as users slowly make their way to OS/2.

The NSTL benchmarks use real applications and data to determine the capabilities of a wide range of system components, including display adapters, bus architectures, processors, memory architecture, hard disks and coprocessors.

Users who are unhappy with a machine's performance have a variety of options. Sometimes a picker-upper is as easy as swapping the system memory. "If you buy the memory from Compaq, you will get really poor performance [on the Compaq Deskpro 286 Model 12]. But if you buy it from Cheetah [Cheetah International, Inc.], you get very good performance," said Jim Hurd, technical director at NSTL.

It is a similar story with the IBM PS/2 Model 50. "With the Model 50, the first megabyte [of random-access memory] runs at 10 MHz with one-wait state. But STB [STB Systems, Inc.] makes a board that expands the memory with 10 MHz and zero-wait state. That makes it very competitive with the AST [system]," Hurd said.

Since all the 386-based systems are fast, and the 286 systems are increasingly bearable, who cares if one system is a bit faster than another?

For complex applications, such as computer-aided design or working with large databases and spreadsheets, the difference between two machines may be large. It may be the difference between going to the mailbox or going to lunch while the computer churns away on a big job.

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NEW PRODUCTS

Systems

Vermont Microsystems, Inc. has announced an advanced graphics system for the IBM Personal Computer XT, PC AT and compatibles.

Called **Page Manager 100**, the graphics processor and monitor incorporate Digital Research, Inc.'s Graphics Environment Manager driver, as well as Microsoft Corp.'s Windows, Lotus Development Corp.'s and Ashton-Tate Corp.'s Dbase drivers, the vendor said. Also available is a version for the IBM Personal System/2 machine. The product is especially suited for manuals and document processing that includes computer-aided design drawings or image-scanning requirements.

Page Manager 100 is priced from $1,995 to $2,495.

Vermont Microsystems, 11 Tigan St., Winnoski, Vt. 05404. 802-655-2860.

Software applications packages

A data analysis and graphics software program that runs on Apple Computer, Inc.'s Macintosh systems has been announced by **Odesta Corp.**

Called the **Data Desk Professional**, the package reportedly allows users to directly analyze data from databases created with the Odesta Double Helix II database management system as well as data from spreadsheets, other personal computer database programs and mainframe-originated ASCII files. The software operates on the Macintosh Plus, Macintosh SE and Macintosh II and is fully compatible with the Macintosh Multifinder system.

Data Desk Professional costs $495.

Odesta Corp., 4084 Commercial Ave., Northbrook, Ill. 60062. 312-498-5615.

Roykore Software, Inc. has released **Opus I Version 2.0**, a drawing program designed for the IBM Personal Computer AT, Personal System/2, Compaq Computer Corp. 386 and compatible systems. The package runs in the Microsoft Corp. Windows 2.0 and Windows/386 environments, the vendor said.

The software reportedly allows a user to point to one part of a picture and bring up either another picture or related information. The program comes with a set of drawing tools for creating technical diagrams, maps, floor plans, flowcharts and schedules. Both 5¼-in. and 3½-in. diskette formats are available.

Upgrades will be available to registered users of previous Opus I versions for $40.

Roykore Software, 749 Brunswick St., San Francisco, Calif. 94112. 415-333-7833.

A personal information-management program that runs in Microsoft Corp.'s Windows 2.03 environment has been announced by **Polaris Software**.

Called **Packrat**, the product is reportedly built on a text and graphics database and includes various facilities to aid the user in organising personal information. Features include Phone Book, Phone Log, Expense Log, Calendar, Agenda, Task List, Index Cards and a Disk File Log. The same information may be displayed on multiple lists depending on the data search requested.

Packrat costs $395.

Polaris Software, 613 W. Valley Pkwy., Suite 323, Escondido, Calif. 92025. 619-743-7800.

Dac Software, Inc. has announced **Hold Everything**, a personal information-management system designed to organize people, places and things.

The memory-resident program reportedly features a multirecord Fast Finder, keyword search, custom reports, follow-up data searches, customizable input screens, multicriteria inquiries and other functions.

In addition, the product provides printing, color and sound capabilities. Dac acquired exclusive marketing rights to the management system from I-Track Corp., which previously marketed the program under the name of Inside Track II.

Hold Everything costs $99.95.

Dac Software, 17950 Preston Road, Suite 800, Dallas, Texas 75252. 214-250-3752.

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▶ On-line and historical audit trails of network access.	▶ Automated session establishment.
▶ Extended user authentication support.	▶ Automated application signon.
▶ Inactivation of terminal/port after security violation.	▶ Automated application status display.
▶ Userids only valid from specific terminals/ports.	▶ On-line Bulletin Board and Help Screens.
▶ Security announcements for dialup ports.	▶ Common message/broadcast facility.
▶ Interfaces to: ACF2, RACF, Top Secret and VM Directory.	▶ Automatic task initiation within TP systems.
	▶ Signon interfaces to: CICS, CMS, Cam-plete, IDMS/DC, IMS/DC, NCCF, Netview, Model204, ROSCOE, TPX and TSO.

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Software utilities

Performance analysis software designed for IBM Personal Computers running Microsoft Corp. MS-DOS or IBM PC-DOS is available from **Spirit of Performance, Inc.**

Called **Personal Measure 1.0**, the package has the ability to portray the combination of resources used by actual applications and presents the information both graphically and numerically, the vendor said.

The product reportedly supports most graphics printer standards, including Epson America, Inc. products and IBM's Proprinter.

The software is also compatible with IBM's Video Graphics Array, Enhanced Graphics Adapter and Color Graphics Adapter as well as Hercules Computer Technology, Inc.'s graphics adapters.

Personal Measure costs $69.95 per copy, with an additional $5 for a 3½-in.-disk format.

Spirit of Performance, 73 Wescott Road, Harvard, Mass. 01451. 508-456-3889.

Creative Solutions, Inc. has announced two new options for its Macforth Plus programming language.

Relocatable Modules run with Macforth Plus Version 3.53 and allow the user to write large programs to run with unlimited memory. The product reportedly reduces token table use, as each Relocatable Module requires only one token and 30 to 60 bytes of object space. The modules cost $99 and are supplied with documentation and demonstration programs.

The **Online Glossary Tool** displays any word in the Macforth Plus Version 3.53 dictionary and is accessed from an integrated text file editor. The tool costs $39.95, with a limited-time introductory price of $29.95.

Creative Solutions, Suite 12, 4701 Randolph Road, Rockville, Md. 20852. 301-984-0262.

The **Grasshopper Group** has taken Sun Microsystems, Inc.'s News — a networked, Adobe Systems, Inc. Postscript-based windowing system — and made it available to run on the Apple Computer, Inc. Macintosh II under A/UX.

The product is called **Macnews** and is said to contain a full Postscript interpreter that can be used to preview Postscript documents before they are sent to a laser printer or phototypesetter. Macnews provides a user interface for applications running on the Macintosh II or on any computer connected to it via a Transmission Control Protocol/Internet Protocol network, the company said.

Macnews costs $225 and includes a manual, the Sun News programs on floppy disks and interface source. Additional machines on the same network may be added for $150 each.

Grasshopper Group, 212 Clayton St., San Francisco, Calif. 94117. 408-266-4783.

Peripherals

A 20-in., autotracking color display monitor, the **Multivision 1000**, is now available from **Taxan U.S.A. Corp.**

The monitor is compatible with IBM's Video Graphics Array, the Professional Graphics Adapter and the Multiple Color Graphics Array graphics boards, the vendor said.

In addition, the product is said to support a noninterlaced resolution of up to 1,024 by 768 and 1,280 by 1,024 pixels with a 0.31mm dot pitch and unlimited colors.

Advanced Dynamic Beam Focusing is included to allow minimal deflection distortion and to maximize resolution.

The Multivision 1000 is priced at $3,695.

Taxan U.S.A., 18005 Cortney Court, City of Industry, Calif. 91748. 800-772-7491.

A desktop accessory that reportedly will raise a personal computer and monitor to allow storage of the keyboard underneath is now available from **Ring King Visibles, Inc.**

The **Keyboard Carrel with Component Control** features a pull-out drawer and includes built-in three-stage surge-power protection. Noise-filtering capabilities are also included, as well as two jacks to accommodate RJ 14S or RJ 45S telephone devices. The product provides modem, monitor and printer operation from a single control. Laminated-finish models cost from $219.95; real oak or walnut-veneer units cost from $269.95.

Ring King Visibles, 2210 Second Ave., Muscatine, Iowa 52761. 319-263-8144.

Laser Connection, Inc. has combined the QMS, Inc. Kissplus laser printer with the QMS Mackiss driver to provide a hardware and software system compatible with Apple Computer, Inc.'s Macintosh computer.

The **Kissplus Macintosh Systems Package** consists of the Kissplus laser printer, the Functionality Card 20, Mackiss and one black toner cartridge. The printer is particularly suited to the needs of the single-workstation office productivity system, the vendor said. The product features a Canon U.S.A., Inc. SX engine, 1M byte of random-access memory, 17 portrait and 17 landscape fonts and dual RS-232 parallel interfaces. Laser Connection is a wholly owned subsidiary of QMS, Inc.

The Kissplus Macintosh Systems Package costs $3,395.

Laser Connection, P.O. Box 850296, Mobile, Ala. 36608. 205-633-7223.

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TI's OmniLaser 2115 printer provides the flexibility you need in multi-application environments. Especially where you have several different hardware systems attached to a network.

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You can connect an OmniLaser to virtually any computer or network. It features multiple standard interfaces for IBM®, DEC®, Apple®, even specialized hardware like CAD/CAM workstations.

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The OmniLaser 2115 prints beautifully on a variety of paper stocks and sizes. Its two 250-sheet paper trays let you load stationery, letter- or legal-size paper, and select the size you need through its easy-to-use front control panel.

The right printers for right now, and in the future.
With the OmniLaser 2115, you have the flexibility you need for today's sophisticated printing applications. You also have the confidence of knowing that your OmniLaser offers a safe path to the applications of the future.

The OmniLaser family also includes the 2106 workstation printer and the 2108 small-cluster printer. So whatever the demand of your application, there's a multipurpose OmniLaser that's right for you.

To find out more, call Texas Instruments toll-free 1-800-527-3500.

TEXAS INSTRUMENTS

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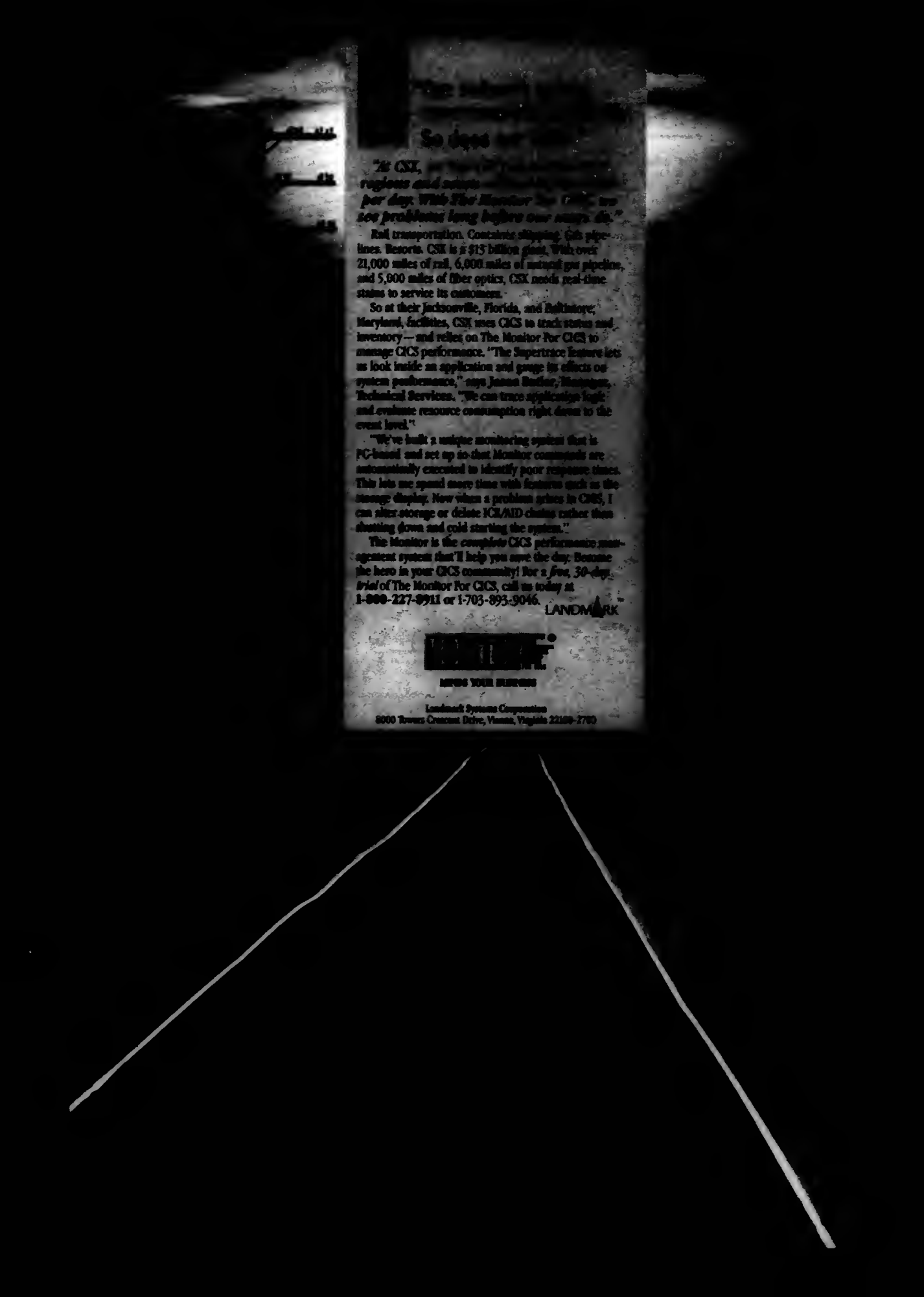

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"At CSX, [illegible] regions and [illegible] per day. With The Monitor [illegible] we see problems long before our users do."

Rail transportation. Container shipping. Gas pipelines. Resorts. CSX is a $13 billion giant. With over 21,000 miles of rail, 6,000 miles of natural gas pipeline, and 5,000 miles of fiber optics, CSX needs real-time status to service its customers.

So at their Jacksonville, Florida, and Baltimore, Maryland, facilities, CSX uses CICS to track status and inventory—and relies on The Monitor For CICS to manage CICS performance. "The Supertrace feature lets us look inside an application and gauge its effects on system performance," says Jason Butler, Manager, Technical Services. "We can trace application logic and evaluate resource consumption right down to the event level."

"We've built a unique monitoring system that is PC-based and set up so that Monitor commands are automatically executed to identify poor response times. This lets me spend more time with features such as the storage display. Now when a problem arises in CICS, I can alter storage or delete ICE/AID chains rather than shutting down and cold starting the system."

The Monitor is the *complete* CICS performance management system that'll help you save the day. Become the hero in your CICS community! For a *free, 30-day trial* of The Monitor For CICS, call us today at **1-800-227-8911** or 1-703-893-9046.

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NETWORKING

DATA STREAM

Harold R. Clark

Get ready for the backhoe

When a backhoe accidentally clipped a fiber-optic cable used for data and telephone communications at a corporate-industrial park in Trumbell, Conn., recently, the greatest disaster that can befall a data network occurred: a failure to communicate. Before long, all but one tenant in the park were unable to go about their normal business.

The Connecticut episode was not as well publicized as the Mother's Day fire that gutted the Illinois Bell central switching office, interrupting data and voice communications traffic in 80 cities and 11 states. Nor did it generate dramatic newspaper photos, like the May Los Angeles high-rise fire that put the First Interstate Bank data center out of commission.

But the three incidents all had something in common: Each touched off the swift execution of several well-thought-out disaster recovery plans.

Network managers cannot predict earthquakes, floods, fires or even backhoe accidents. But a prudent manager knows that in today's world, disasters can occur. And if you cannot communicate, you might as well be out of business.

There are two general misconceptions about disaster recovery planning. First, most managers ask the wrong question: "What will it cost?" They should instead determine, "How

Continued on page 60

Checkpoints against viruses

BY PATRICIA KEEFE
CW STAFF

VAIL, Colo. — Following a two-day meeting here two weeks ago, a small working group of network manufacturers has produced a set of recommendations for combating software viruses and enhancing the reliability of distributed systems.

Attending were Datapoint Corp., Novell, Inc., ADI and Elgar Corp. Supporters are Digital Equipment Corp., Alloy Computer Corp. and Proteon, Inc.

The meeting was organized and hosted by Delbert Jones, founder of the newly formed Washington, D.C.-based National Local-Area Network.

The Vail meeting was predicated on the theory that viruses are a real but controllable concern for administrators of distributed systems. The most effective defense against these system threats, according to the group, is a focus on total system reliability with support from senior management.

The draft recommendations are being circulated to network vendors and other interested parties.

Battening down

Jones cautioned that as with any security measure, the level of protection desired must be weighed against the need for and cost of the solution. Recommendations include the following:

- All software should be purchased from known, reputable sources.
- All purchased software should be in its original shrink-wrap or sealed-disk containers when received.
- Backup copies of all original software should be made as soon as the package is opened and stored off-site.
- Before installation, all software should be reviewed carefully by a systems manager.
- New software should be quarantined on an isolated computer to greatly reduce contamination risk.
- A backup copy of all system software and data should be made at least once a month and stored for at least one year before reuse. This will allow restoration of a system that has been contaminated by a time-release virus. A plan that includes "grandfathered" rotation of backup copies will reduce risk even further.
- System administrators should restrict access to programs and data on a need-to-use basis. This isolates problems, protects critical applications and facilitates problem diagnostics.
- All programs on a system should be checked regularly for size changes. Any size deviations could be evidence of tampering or virus infiltration.
- Many shareware and freeware programs provide a prime entry point for viruses. Skeptical review and extended quarantine of such programs are prudent.
- Plans should be made to quickly remove any software that exhibits symptoms of contamination and to immediately back up all related data. Users should be informed of these plans, which should be tested and reviewed periodically.

Worldwide link is goal at Interop

BY PATRICIA KEEFE
CW STAFF

SANTA CLARA, Calif. — "You can't get there from here" is one refrain visitors should not be hearing while attending next week's Interop 88.

The third Transmission Control Protocol/Internet Protocol (TCP/IP) interoperability conference and exhibition will take place here from Sept. 26-30.

Real-time multivendor communications is the goal of a crazy quilt of media, topologies, protocols and applications woven into a show-encompassing floor network that will boast worldwide links.

The network is designed to prove to users that they have options, according to Peter de Vrief, the show's network

Continued on page 61

Data View

Telecom spending in 2001

A profile of projected telecom services and equipment expenditures shows that a tiny segment of the market, made up of major corporations, will do the bulk of the buying

CW CHART

Docs order X.25 link

BY KATHY CHIN LEONG
CW STAFF

SALT LAKE CITY — Novell, Inc.'s newly shipped X.25 Extended Gateway is proving its usefulness as a micro-to-mainframe link, allowing doctors using IBM Personal System/2s to access patient files on Tandem Computers, Inc. hosts, according to its initial user, the University of Utah Hospital.

Last month, the hospital installed the gateway in the radiology department at the request of doctors who wanted access to patient files on a Tandem TXP Nonstop II host. The Tandem system functions as the central computer for the entire hospital.

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Inside

- McDonnell Douglas extends E-mail support to IBM PCs. Page 56.
- Timeplex addresses voice/data. Page 56.
- Ethernet products beating a coming high-speed standard out the door. Page 58.
- You want price cuts? You got 'em. Page 58.

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Tymnet E-mail service gets a lift

BY JEAN S. BOZMAN
CW STAFF

ST. LOUIS — McDonnell Douglas Information Systems Co. has upgraded two major components of its Tymnet Ontyme electronic mail service, enhancing the Filexchange electronic messaging service and offering a new interface between Ontyme and users of IBM's Professional Office System (Profs).

Announced last month, the enhancements were designed to meet requests from Ontyme users for greater access to IBM Personal Computers and mainframe systems. Ontyme was originally designed to connect any ASCII device to any other, but new software will allow connection to Profs, Tymnet said.

"We discovered that the market needed to take geographically distributed data and move it into a corporate mainframe environment," said Bruce Watkins, Filexchange product manager, who also noted that data flows in the other direction.

The Filexchange service, called Version 2.0, will allow customers to schedule overnight batch collection of data from scattered PCs. Since the PCs will initiate the mainframe updates, the Filexchange process reverses the method of traditional top-down polling techniques.

Version 2.0 will collect PC data and then consolidate it for presentation to the mainframe. One target will be franchise operations that need to report overnight sales figures to a central-site computer, Watkins said.

Key features of Filexchange Version 2.0 include automatic restart to re-establish an interrupted link, PC log file creation to provide an audit trail capable of tracking transmission errors, user-controlled defaults and improved logon procedures.

The Ontyme Plus-to-Profs service allows Profs users to send both notes and final Document Composition Facility drafts to Ontyme users who cannot access a Profs system. The service would have to be customized to match a specific customer's computer environment, Tymnet said.

Pricing for the Tymnet services varies depending upon the time of day, the type of service, the frequency of service and the type of computers being linked.

Timeplex adds low-end T1 switch

WOODCLIFF LAKE, N.J. — Addressing the needs of small sites with limited voice and data traffic, Unisys Corp. subsidiary Timeplex, Inc. recently announced Microlink/2. The low-end T1 switch is said to support one or two lines with speeds ranging from 50 to 2M bit/sec.

Microlink/2 allows users the choice of either bringing a 56K or 1.5M bit/sec. backbone out to remote sites or migrating from standard analog-line modems to a digital network, Timeplex product manager Bryan Hall said.

While high-speed analog modems support point-to-point links, Microlink/2 can act as a multiplexer, collecting low-speed transmissions from a group of remote sites or local devices and sending them out over a single T1 line to another link switch, Hall said. This enables companies to save money by using fewer point-to-point circuits, he claimed.

The product sends input from both digital and analog devices. It reportedly supports voice compression protocols such as Adaptive Digital Pulse Code Modulation and can handle both voice and data transmissions over the same aggregate link. The device can be managed either from a local supervisory port or from Timeplex's Link Network Management System.

Microlink/2 is priced from $3,500 and reportedly will be available in October.

We design software to interface with the most important part of your business.

Without taking anything away from R&D, strategic planning or corporate communications, people are still the heart of every successful business.

A point that often escapes many software vendors, who seem to develop business applications with less regard for the people who use your computer than for the computer itself.

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So flexible, in fact, that people can easily tailor applications to their individual needs. For example, a health care user might set up our Human Resource package to monitor their nursing staff schedule, while a manufacturer uses it to track grievances and arbitration results. Whereas our PC Link software lets anyone turn their desktop PC into a personal reporting and modeling tool.

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We put the customer in control of the software.

Coming 10BaseT standard for Ethernet sparks product rush

BY PATRICIA KEEFE
CW STAFF

The 10BaseT standard for running high-speed Ethernet over telephone wire may be inching toward completion, but vendors eyeing the huge installed base of unshielded twisted-pair are racing compatible Ethernet products out the door.

Besides allowing users to more fully utilize their existing wiring, an interesting sidelight to 10BaseT could be its impact on token-ring.

At least one network analyst said he believes this mid-life kicker to the lowly unshielded twisted-pair could put a damper on token-ring sales.

Despite an extremely large community of Ethernet suppliers compared with a handful of token-ring providers, network analysts have been predicting that local network token-ring sales will catch up and surpass Ethernet in relatively short order.

This supposition has resulted in extremely robust sales predictions for token ring, but International Data Corp. (IDC), a market research firm in Framingham, Mass., last week said it may revise its token-ring forecast. Thanks to twisted pair's rise in popularity, "the demand for the current token ring hasn't been as swift as I had expected," IDC analyst Doug Gold said.

Nor has the rosy picture for token ring attracted many vendors. Instead, many are busy putting together Ethernets compliant with the emerging 10BaseT standard. Among the vendors recently unveiling products in this area are David Systems, Inc., Western Digital, Codenoll Technology Corp. and Micom-Interlan, Inc.

• David Systems in Sunnyvale, Calif., last week introduced Expressnet, an intelligent Ethernet hub for twisted-pair nets. The system reportedly features integrated personal computer- or terminal-based management and control functions, a competitive price-per-port connection and a compact size. Expressnet costs $2,495 per hub and $149 per TP-MAU.

• Codenoll said it is shipping the Multistar multiport repeater and associated family of multimedia-compatible Ethernet products. It reportedly integrates fiber-optic twisted-pair thin and thick coaxial cable, supporting any combination of 15 segments and allowing users to run fiber to the desk top. Pricing ranges from $175 to $1,095.

• Western Digital announced three products: the Ethercard Plus TP, the Lattisnet Concentrator and the Lattisnet Transceiver. The Ethercard, including Superdisk, costs $499 and links PCs to twisted-pair local-area networks. It features Synoptics Communications, Inc. Lattisnet-compatible transceiver circuitry and an RJ-45 connector. The transceiver costs $155 and is an external box that attaches any PC or terminal to a twisted-pair LAN. The concentrator costs $2,995 and features eight RJ-45 ports, allowing users to daisy chain to additional hubs through a Thin Ethernet uplink port.

• Micom-Interlan unveiled the 2500/UTP series of concentrators, said to interconnect as many as eight PCs using twisted-paired cable. Targeted at work group clusters, the WG-2500/UTP ($2,695) and the WGR-2510/UTP ($2,995) concentrators work with Interlan workstation controllers. Both are available now.

Vendors slicing, dicing prices

Two vendors have cut prices on products spanning an array of technologies.

AT&T has been particularly busy in this department, cutting Starlan and Accunet prices. It has announced a 25% price reduction on its 1M bit/sec. Starlan PC Network Access Unit, an adapter board used to connect IBM Personal Computer XT- and AT-compatible machines to the Starlan network. The price of the board will be cut $100 to $295.

AT&T has also announced a simplified pricing structure for its Accunet T45 service, which provides customers with 45M bit/sec. two-way digital transmission.

The structure, which is scheduled to take effect Oct. 7, consists of a $6,000 monthly charge plus charges ranging from $130 to $180 per mile, depending on the length of contract. This change will lower costs for customers who use the service for long-haul transmission.

Public network users can take advantage of lower off-peak rates for Telenet access to Portal Communications' Portal System. This rate restructuring reportedly makes Portal the lowest cost on-line communications service in the nation — at least during off-peak hours. The new rate for off-peak use is $2.50 per hour and includes all charges for users except those sending excessive amounts of data or more than 2,500 segments per hour. Off-peak hours were extended to cover all day on weekends and from 6 p.m. to 7 a.m. local time, Monday through Friday.

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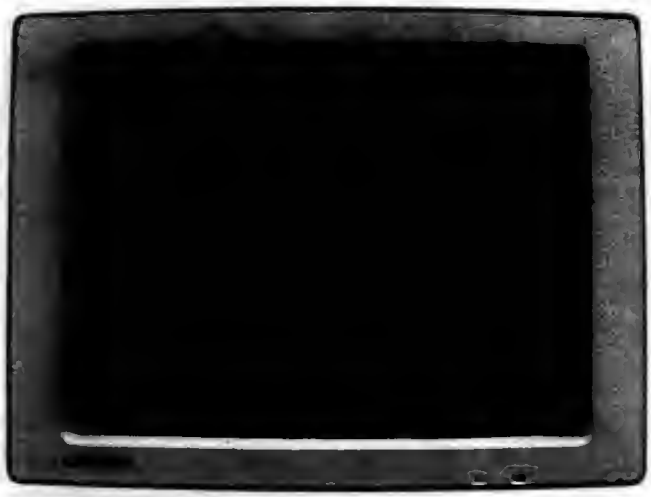

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Computerworld Extra on IBM
Issue Date: November 16 Ad Close: October 14

Despite growing challenges, IBM is still the industry leader. And after 1987 saw a year of promises from Big Blue, 1988 brought a year of reorganization in an effort to fulfill those promises.

On November 16, *Computerworld Extra*, a special publication from *Computerworld*, will take a close look at that reorganization. It will focus on the products and directions that Big Blue announced during the last 12 months—and reveal how users have reacted to them. It's an important story, and one you won't want to miss!

Computerworld Extra will look closely at IBM's reorganization with planned topics like:

- **IBM's new mainframe strategy.** Experts believe the company must reposition the mainframe as a database machine and network hub. We'll look at new and future mainframe technology from Big Blue.
- **A beefed up software front.** Two new software-only divisions should make IBM an even greater force in the applications market. Here's a look at the strategies and likelihood of success for these new segments.
- **The perils of reorganization.** We'll examine the effects of a radical restructuring—including the redeployment of thousands of employees from the factory to the field.
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COMPUTERWORLD Extra

An IDG Communications Publication

Clark

FROM PAGE 55

much will we lose for every minute that the network is down?"

The amount of resources dedicated to disaster recovery varies. For example, California firms spend millions strapping down equipment and placing redundant communications gear in earthquake-proof buildings. But disaster can strike even outside the San Andreas Fault zone.

Ask those businesses in Connecticut disrupted by the backhoe whether they were victims of a minor inconvenience or a disaster that cost millions of dollars. Then ask the one firm that stayed in business, the Union Trust Co., whether the planning and resources it spent on disaster recovery were justified.

Fortunately for the bank, it had established redundant T1 networks — one fiber-optic- and the other copper-based — entering the central computer center at different points.

When the backhoe took out the fiber cable, service via the copper-based T1 network — which linked the bank's mainframe-based on-line tellers in 60 branches and 100 automated teller machines — continued uninterrupted. The bank did not lose a single transaction during the disaster.

The Greenville, S.C.-based subsidiary of Michelin Tire is in the initial stages of backup planning for a network that connects corporate offices, manufacturing centers and distribution points at seven major data processing sites in the U.S. and some international sites as well. Installing alternate cabling to support its T1 links would involve digging some 20 miles of trenches at a cost that is unacceptable to Michelin.

Bird in the hand

Which leads us to the second misconception: A successful recovery plan will return the network to the way it was the moment the system crashed. A more realistic view is that disaster recovery plans are much like buying an insurance policy that pays specified amounts for the loss of specific limbs. Although insurance makes certain that you will have some money to help you adjust, it still would be much better to keep your arm.

As the analogy suggests, disaster planning requires a modular approach to setting priorities and determining what recovery actions to take.

Among the host of variables to be considered are the following: What happens if you lose a remote site? What happens if your data center goes down? What happens if the central telephone office catches fire? Likewise, what equipment do you have available that could be brought into service quickly?

Does your vendor contract provide for backup equipment on short notice? Can you get by with contracting standby service with communications and disaster recovery firms, or, given the constant drain on the budget that those services cost, would it be more economical to set up an emergency microwave transmission facility or a remote backup data center?

Michelin is currently taking inventory of the options it has at its disposal, including dial-in backup lines supporting some of the sites, equipment that could easily be duplicated or replaced, standby carriers for T1 networks and so forth.

The company has concluded that its recovery system must use the same or similar gear to what is found in its current system so that if something happens, recovery efforts will not be hampered by having to teach personnel new tricks. The key is to eliminate unpleasant surprises that could delay uptime.

Will the plan work? There's really only one way to find out for sure. Short of torching the network or bringing in a backhoe, the next stage involves testing, rehearsals and reviews to help fine-tune procedures.

A truly successful strategy will see disaster recovery planning for what it is: risk avoidance. And given that definition, there will be no final stage.

Clark is a senior applications consultant and district manager at Digital Communications Associates, Inc.

Docs

FROM PAGE 55

According to programmer Eric Bozich, the hospital has standardized on Novell's Netware network operating system. During the past year, the radiology department has been using a bevy of 50 IBM PS/2s on two IBM Token-Ring networks. The hospital's doctors have been using word processing applications and some electronic mail.

However, as the patient load began increasing in recent months, the doctors began needing quick access to host-based client files. One physician has pushed for a goal of updating a record within six hours of the patient leaving the hospital.

Getting to the host from the network via packet switching was a natural, since the Tandem host already uses a Memotec Data, Inc. packet switch for simple remote terminal support of some 100 terminals.

The hospital evaluated CCITT X.25 gateways from both Novell, Inc. and Gateway Communications, Inc. in Irvine, Calif. While Bozich said he found both to be excellent, the decision fell to the side of the Novell gateway because it claims to support as many as 254 ASCII sessions on a card, whereas the GX25 Gateway can support only up to 64 sessions.

Even so, Bozich said the performance on the GX25 card was superior in some respects, since Gateway can access Novell's proprietary IPX protocol directly, whereas Novell's gateway accesses the IBM Netbios program. "Going to Netbios can tend to slow down the network when there is heavy traffic, but we expect the next version [of the Extended gateway] to support IPX," Bozich said.

Installing Novell's gateway board was relatively simple, since the hospital already had experience installing local-area networks and supporting X.25 communications, Bozich said. Getting the $1,150 gateway up and running involved linking a ring of PCs to an AT&T PC 6300 computer, which functions as a dedicated gateway connected to the host's X.25 switch and host controller. The appropriate software drivers and communications software are loaded into each node on the network. No software additions or changes were required at the host.

ONE physician has pushed for a goal of updating a record within six hours of the patient leaving the hospital.

Under the new system, for example, the following scenario

Continued on page 61

Docs

FROM PAGE 60

is possible: A doctor views a client X-ray, dictating a verbal diagnosis into the cassette recorder. From there, the secretary transcribes the tape into the Tandem terminal. From his PC, the doctor accesses and checks the transcribed patient file, uploading a response back to the mainframe.

Today, only eight doctors are using the gateway in a controlled test. Bozich said users are quickly learning how to access Tandem-based client files, taking just two days to become familiar with the gateway and what it can do.

The hospital is now trying to decide which departments will have access to the mainframe and to what kinds of data. The advent of mainframe access could open a Pandora's box of security and access concerns, an issue that must be settled before extending host access throughout the hospital, Bozich said.

Meanwhile, once the rest of the radiology lab doctors have tapped into the host system, the plan is to bring the nursing administration department on-line, followed by the pharmacy department.

Worldwide

FROM PAGE 55

administrator and manager of marketing support for The Wollongong Group, Inc. "Users can safely buy the pieces they need from different vendors, and as long as they support TCP/IP, they will work together."

The more than 50 exhibitors are required to attach to the network, and all seven layers corresponding to the Open Systems Interconnect (OSI) model will be present in each booth, de Vrief said. The key to the network is that each node should be able to communicate with any other node on the network. "We're encouraging people to go wild."

There will be some, but not many, OSI packets on the network, most likely from Excelan, Inc., Wollongong and Spider Systems, he added.

The roughly 100-node network will feature just under 10 miles of seven different kinds of cabling, including thick and thin Ethernet, shielded and unshielded twisted-pair wire, fiber optics and T1 lines, according to de Vrief. The two T1 lines alone cover between seven and nine miles and cost about $10,000.

A control center will monitor and track all network activity. It will feature a tornado-like funnel of cabling from all the network nodes, which will come down from the ceiling into a tower structure surrounded by a mix of different router boxes.

An interesting twist to the show network is worldwide access, thanks to two T1 links — one provided by MCI Communications Corp. for IBM's link into Stanford University and another underwritten by show sponsor Advanced Computing Environments (ACE), which ties into the National Aeronautics and Space Administration.

Via X.25 out to a Defense Data Network backbone, users tapping into either remote network will be able to travel further onto Stanford's National Science Foundation NFS Net or any of three NASA-linked networks, including Arpanet, Milnet and an internal network.

About 1,800 attendees, more than double the number at the show in December, are expected to turn out. In addition to the network and control center, two protocols will be demonstrated: Netman and Simple Network Management Protocol (SNMP).

Netman is being designed by an ad hoc group of vendors to provide centralized control for multivendor TCP/IP networks based on OSI applications protocols. It reportedly will provide the basis for a smooth transition to the OSI model. Commercial products should be available in about eight months, according to show sponsor ACE.

> THE KEY to the network is that each node should be able to communicate with any other node on the network. "We're encouraging people to go wild."
>
> PETER DE VRIEF
> WOLLONGONG GROUP

The Netman demonstration will be cosponsored by a number of vendors said to be implementing the International Standards Organization's CMIP/CMIS protocols in an effort to define and build a working network management system.

The vendors include 3Com Corp., CMC, Convergent Technologies, Inc., Digital Equipment Corp., Excelan, Hewlett-Packard Co., Mitre Corp., Network General Corp., Sun Microsystems, Inc., Sytek, Inc., Ungermann-Bass, Inc. and Unisys Corp. The demo has received a stamp of approval from the OSI/Network Management Forum, while CMIS/CMIP has been recommended for advancement to the Draft International Standard.

Also garnering a show of support is the SNMP protocol, for which products exist today. It shares a common Management Information Base (MIB) with CMIP, OSI's proposed future network management protocol. MIB will ensure the transition from SNMP to CMIP, according to Professor Jeffrey Case at the University of Tennessee.

SNMP supercedes the Simple Gateway Monitoring Protocol by virtue of its ability to also provide a well-defined migration path from TCP/IP to OSI. As such, it is an approved standard protocol for network management on all TCP/IP-based nets.

This demo is also supported by a slew of vendors, including Cisco Systems, Inc., FTP Software, Inc., Proteon, Inc., Wellfleet Communications, Inc. and Wollongong.

NEW PRODUCTS

Electronic mail

Da Vinci Systems Corp. has reduced the price on its **E-Mail for Windows** product. Originally sold for $99 per user, the software has been repackaged in an entry-level five-user kit that will sell for $445. A 20-user version of the product will be available for $895.

The company has also announced **E-mail for DOS**, a text-based electronic mail package. The product is memory-resident and allows users instant access to mail-creation facilities. Users are notified of incoming messages, and password protection capabilities are included. The software will be packaged in five- and 20-user kits and will cost $295 and $795, respectively.

Da Vinci Systems, P.O. Box 5427, Raleigh, N.C. 27650. 919-839-2000.

Modems/Multiplexers

Hayes Microcomputer Products, Inc. has introduced the **Smartmodem 9600**, a CCITT V.32-compatible modem that was developed for data communications network applications. The product is targeted at mainframe and local-area network environments that require high-speed, full-duplex communications for transferring large volumes of data from host to host, between data processing centers and remote controllers and from LANs to host.

According to the vendor, Smartmodem 9600 Version 1.0 offers full-duplex, asynchronous and synchronous, 9.6K and 4.8K bit/sec. leased-line and dial-up communications capabilities through support of CCITT V.32. The product also implements trellis-coded modulation to provide error-correction and echo-cancellation techniques.

Smartmodem 9600 Version 1.0 costs $1,999.

Hayes Microcomputer Products, P.O. Box 105203, Atlanta, Ga. 30348. 404-449-8791.

Diagnostic equipment

Ingram System Associates has released a computer-based utility designed to assist configuration managers in integrating complex technical systems.

Called the **System Integration Aid**, the product can reportedly be used to integrate any type of system, including networking, electronic publishing, office automation and telecommunications. Product capabilities include troubleshooting, system analysis and product testing and verification.

An IBM Personal Computer or compatible machine with a minimum of 256K bytes of random-access memory is required. A hard disk is recommended by the vendor.

System Integration Aid costs $59.

Ingram System Associates, Opequon Ridge III, Route 1, Box 734, Stephenson, Va. 22656. 703-662-4826.

FTP Software, Inc. has announced **Version 1.2** of **Lanwatch**, the company's network software analyzer.

This version extends Lanwatch to the IBM Token-Ring using Proteon, Inc.'s Pronet-4 card and also provides protocol recognition for Banyan Systems, Inc.'s Virtual Networking Software, or Vines.

The product has two operational modes. The display mode reportedly captures all the packets on the local-area network, stores them in a buffer and displays them on the screen. The examine mode allows the user to scroll among the stored packets or zoom in to inspect an individual packet in detail.

Lanwatch 1.2 costs $1,200 with site-license pricing for five or more copies.

FTP Software, P.O. Box 150, Kendall Square Branch, Boston, Mass. 02142. 617-868-4878.

A simulation package for transmission-line analysis has been announced by **Quad Design Technology, Inc.**

The product, called **Transmission Line Calculator (TLC)**, is a time-domain simulator for digital-circuit interconnect analysis.

According to the vendor, TLC will simulate any transmission line that may be an element in a digital system, including printed-circuit board trace, wire wrap, ribbon cable and coaxial cable. The product will run on IBM Personal Computers — a math coprocessor is recommended — and Sun Microsystems, Inc. and Apollo Computer, Inc. workstations.

TLC is priced from $3,550.

Quad Design Technology, Suite 111, 321 N. Aviador, Camarillo, Calif. 93010. 805-987-6221.

Cabling

Belden Wire and Cable has announced two 75-ohm coaxial cables designed specifically for Manufacturing Automated Protocol (MAP) networks.

The **1223A RG-6/U Type** cable is intended for use with broadband and carrierband drop applications from the cable trunk to individual workstations. The **1224A RG-11/U Type** cable can be used for either trunk or carrierband transmission, the vendor said, or as drop cable for broadband and carrierband signal transmission. The 1223A costs $220, and the 1224A costs $377.

Belden, P.O. Box 1980, Richmond, Ind. 47375. 800-235-3364.

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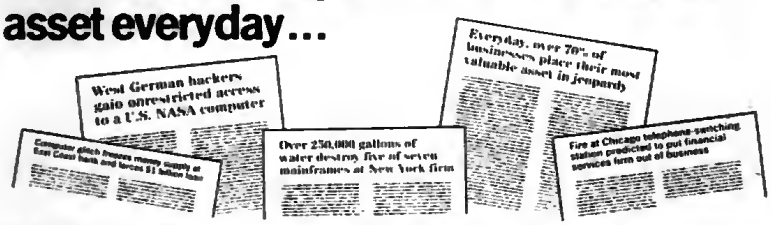

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LARGE AND MEDIUM-SCALE SYSTEMS

DEC and IBM chart course to a standoff

BY STANLEY GIBSON

"Don't look back, something might be gaining on you."
Satchel Paige

In the past year, major computer systems vendors did look back, and what they saw gaining on them was Unix. And if Unix was to overtake them, they wanted to pretend they were on the same team.

But despite furtive glances at Unix, vendors spent most of their energy expanding the reach of their proprietary operating systems. In doing so, both IBM and Digital Equipment Corp. reinforced their strengths — IBM in mainframes and DEC in the mid-range. DEC also set out to invade IBM's mainframe turf with commercial transaction processing systems.

IBM, meanwhile, sought to reassert itself as the mid-range leader. These rivals are so strongly entrenched on their home ground, however, that territorial gains are likely to be small and hard-won.

IBM and DEC did, however, find common ground in the Open Software Foundation (OSF), which both companies deemed an effective hedge to their Unix product offerings. With OSF, they could lay claim to being as open as anyone else — if that indeed is what users want.

Unix rhetoric was full of statements of intentions to support the operating system wholeheartedly — in the future. The most notable of these pronouncements was IBM's statement that all 370 architecture systems will support AIX, its version of Unix.

MICK WIGGINS

Unix-based product announcements, while numerous, were limited mostly to systems from smaller vendors that are betting their success on the operating system.

Although annointing Unix on one hand, IBM reasserted its longstanding mainframe leadership on the other by introducing the MVS/ESA operating system in February and then enhancing its 3090 series with the announcement of the Model S in July.

Although plug-compatible rival Amdahl Corp. leapfrogged IBM's mainframe performance by introducing the 5990 line before IBM could get the Model S out the door, Amdahl pledged allegiance to ESA, saying its computers would run the operating system by whatever means necessary.

In the mid-range, DEC introduced symmetrical multiprocessing versions of its VAX line, new on-line transaction processing software and a more powerful disk array. Together, these improvements give DEC far stronger offerings for mainstream commercial users than ever before and could allow DEC entry into IBM's banking and insurance heartland.

DEC used many public forums to state that it is the market share leader in Unix and has been for nearly 20 years. In August, DEC unveiled Ultrix 32 Version 3.0, which complied with the recently voted Posix standard.

While DEC was endowing its VAXs with a new multiprocessing persona, IBM was in the mid-range wilderness for most of the year as the 9370 was caught in an identity crisis when it failed to meet sales expectations.

The resulting void created a pregnant pause in advance of the arrival of IBM's Application System/400, long spoken of as Silverlake. When the June announcement came, nearly two years of speculation culminated in one of the most elaborate rollouts in IBM history.

LARGE SYSTEMS

While IBM groped for the right notes in the mid-range, no such fumbling occurred in the mainframe realm. There, plug-compatible rivals are still dancing to IBM's tune and will be for the next several years, at least, following the debut of MVS/ESA, IBM's new number.

ESA gave the 3090 Model E key importance in the mainframe migration pattern, because at the introduction of ESA, the Model E could run the operating system but 3090 base models could not. Later, the Model S was also given ESA capability.

ESA offers 16 terabytes of virtual storage, an amount IBM says is 8,000 times more than was previously accessible. IBM

Gibson is *Computerworld*'s senior editor, software.

INSIDE

Product Charts
Guides to major large, medium-scale and special-purpose systems. Charts begin on pages 70, 73 and 84.

Unix gains, Minisupers lose
In the special-purpose market, minisupers lose luster and the big guns target Unix portability. Page 81.

Course tally

FROM PREVIOUS PAGE

Vice-President Carl Conti predicts that capacity will satisfy the most demanding users' needs for more than seven years to come.

The benefits of ESA are most likely to be felt at IBM's bread-and-butter accounts — the nation's largest MIS shops that use quantities of IBM mainframes, software and peripherals. IBM claims that existing applications, particularly IMS applications, will run 10% to 12% more efficiently under ESA.

At the Model S rollout in July, George DiNardo, executive vice-president at Mellon Bank NA in Pittsburgh, termed customer migration to ESA a "no-brainer" because of the capabilities it adds. At that time, DiNardo and others who have installed the operating system testified that doing so is much simpler than converting to MVS/XA was.

While a great many IBM mainframe users are in no need of 16 terabytes of addressability, the purpose of ESA may not be in satisfying most of today's customer needs but in providing a data highway to the future, particularly for DB2 users.

Another part of the ESA announcement was PR/SM, a hardware feature within 3090 Model E and S mainframes that allows customers to run a single processor as if it were four separate computers with different operating environments. The multiprocessor 3090s can have each of their two sides partitioned into four processors, yielding a total of eight processors.

PR/SM answers Amdahl's Multiple Domain Facility, a product on the market for several years that performs a similar function.

Also announced with ESA were the 3090 Models 280E and 500E, which filled gaps in the 3090 line. The 500E is a five-processor model; the 280E is two Model 180Es strapped together.

IBM also rolled out two ESA-capable 4381 models, the 91E and 92E, capable of 4.8 and 8.1 million instructions per second (MIPS), respectively. Both are slated to ship in November.

> THE BENEFITS of ESA are likely to be felt at IBM's bread-and-butter accounts — the largest MIS shops that use quantities of IBM mainframes, software and peripherals.

The summer's 3090 Model S announcement brought a 15% to 25% price/performance improvement over the Model E, according to IBM. Also added was another gap-filler, the Model 170S.

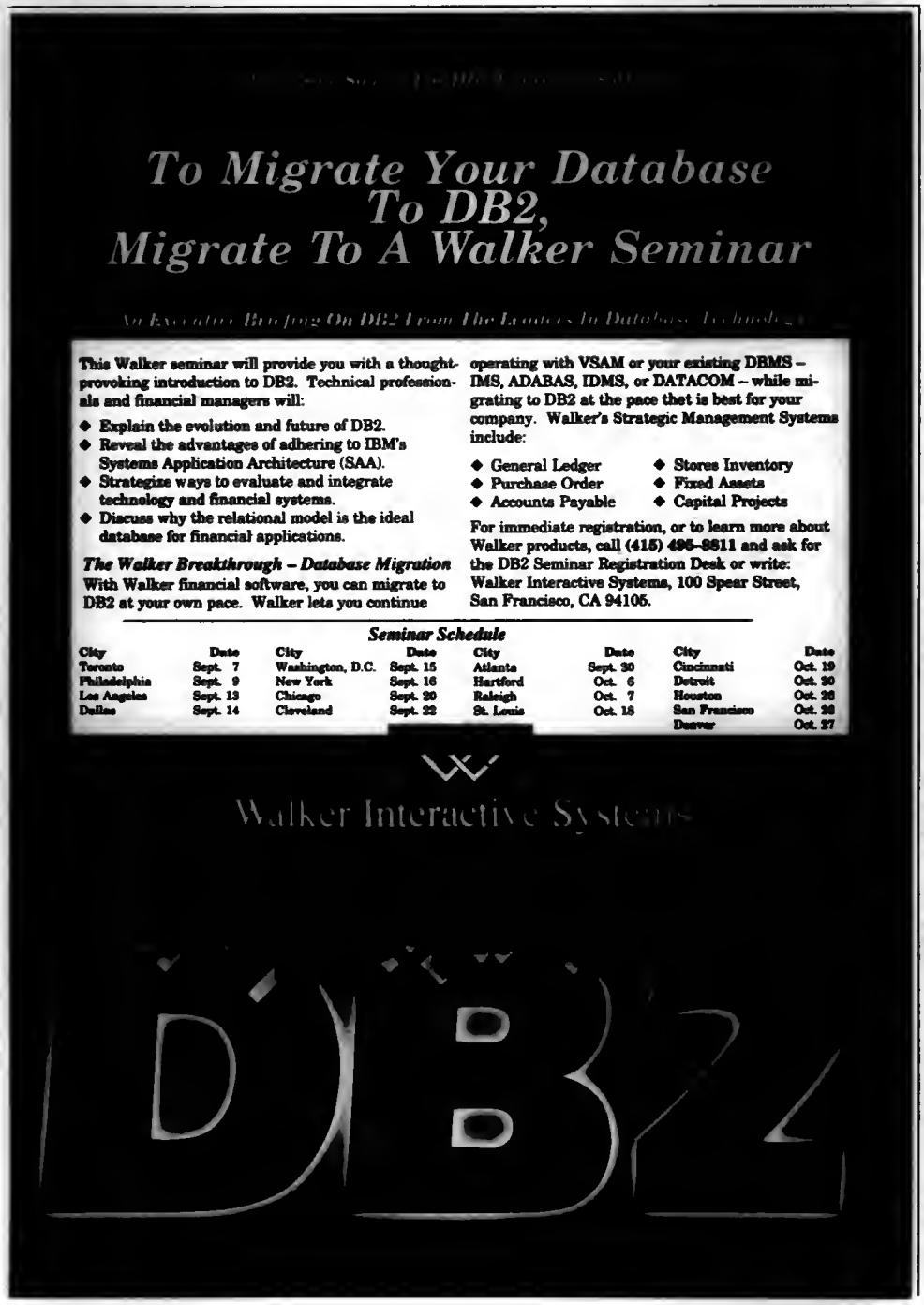
The 3090 Model 600S became IBM's most powerful mainframe ever, capable by most estimates of more than 100 MIPS. Technologically, the Model S continues to use the same type of liquid-cooled thermal conduction modules employed in current 3090s.

IBM did not leave out its direct-access storage devices (DASD) in catering to the needs of the largest MIS shops. The 3380 Models J, K and CJ2 and the 3990 controller began shipping within the last year, showing good reliability for new products. Also announced were 4.5M byte/sec. channel speeds.

However, the 3990 Model 3 controller — which will include advanced cache features — slipped past its original ship date in the third quarter and is scheduled to roll out instead in early 1989.

The combination of Model S power, ESA, industry-leading DASDs and the coming 3990 Model 3 will put plug-compatible rivals in the position of shooting at an ever-receding target. Robert Djurdjevic, president of Annex Research in Phoenix, says ESA alone gives IBM at least a year's lead over Amdahl.

Perhaps goaded by ESA, Amdahl introduced its 5990 series in May, consisting of one to four processors capable of as many as 100 MIPS. A dual-processor version was shipped in the spring, and the full quad-



processor version is scheduled to ship in the fourth quarter — about the same time as IBM's Model S.

"IBM made us more bullish when it announced ESA," says Eugene White, Amdahl's vice-chairman. "It allows you to do more things because you know what the architecture will look like in five years."

Amdahl's plug-compatible counterpart, National Advanced Systems (NAS), completely overhauled its mainframe line in September, renaming it the AS/EX line and expanding the number of processors in the family from six to 15. NAS's top-of-the line AS/EX 100 offers 88 MIPS, exceeding its high-end predecessor AS/XL 100, which offers 81 MIPS.

NAS chased the IBM DASDs by introducing its version of the Models J and K. NAS boasted lower prices and smaller footprints for its 7380 DASDs. NAS also introduced optical channels and transfer rates of 4.5M and 6M byte/sec.

Lurking in the shadows of the big iron boxes was start-up Andor Systems, Inc., a Cupertino, Calif., company launched by Gene Amdahl to create a mainframe to compete with IBM's 3090 Model 150. The system is said to perform between 7.5 and 10 MIPS, run MVS and cost 15% less than its comparable IBM model.

"We will be a mosquito in the side of IBM. But we hope to be one that is satiated with blood," says Amdahl, who has drawn blood and been bloodied before in the start-up game.

Although not plug-compatible with IBM, DEC added itself to IBM's mainframe competitors with its 8800 series. "Our goal is to match the best in the mainframe business," DEC President Ken Olsen declares.

The last of the BUNCH

Meanwhile, the survivors of what was once called the BUNCH companies — Unisys Corp., Honeywell Bull, Inc., Control Data Corp. and NCR Corp. — face an uphill battle in wresting any leadership from IBM, according to George Lindamood, an industry analyst at the Gartner Group, Inc. in Stamford, Conn.

"The BUNCH has to provide equivalent functionality [to IBM], or they will sit there fiddling while Rome burns," Lindamood says.

Of the BUNCH, Lindamood says that NCR is in the best shape, noting, "They have some spirit. Although the company is not strong in market share, they will endure."

For its part, Unisys made good on Chairman W. Michael Blumenthal's promise that both Burroughs and Sperry-type systems would be enhanced.

In November 1987, Unisys added the A 17 to the high end of the former Burroughs mainframe line.

In addition, Unisys added the Model 12E as an entry system in its mainframe family.

Not to be forgotten

On the other side of the house, Unisys announced in January two entry-level 1100/90 models, the 1100/91 and 1100/92 Model II SV mainframes.

In September, Unisys superseded its 1100 series with the 2200 series, adding the 2200/600 to its mid-range mainframe line. The 2200/600 offers twice the performance of the 1100/90.

In April, CDC added six Cyber 960 models, positioning them as mid-range mainframes between the 990 series at the high end and the 930 series at the low end.

The air-cooled systems, capable of 8.9 to 26.7 MIPS, replace the water-cooled Cyber 860 and complete the replacement of the Cyber line that began two years ago.

In addition, CDC released NOS/VE Release 1.3.1, which allows users to cluster up to eight Cybers.

CDC also put forth a plan called the transparent computing environment, in which it will tie together the processors of different vendors, using standard user interfaces.

"Two years ago, the patient — meaning us — was on the operating table, bleeding profusely. But the hemorrhaging has stopped," explains Gil Williams, CDC vice-president.

networks. Most market analysts saw LANs on the rise and the minicomputer market at a standstill.

In two announcements — for the 8800 "Polar Star" series and the 6200 "Calypso" series — DEC effectively replaced all but the low end of the VAX line. In so doing, it brought the blessings of symmetrical multiprocessing to all but Microvax users.

Symmetrical multiprocessing, or SMP, as DEC calls it, overcomes a throughput bottleneck characteristic of asymmetrical multiprocessing that had impeded high-volume transaction processing. That characteristic had caused some users to shy away from DEC as an on-line transaction processor (OLTP) vendor.

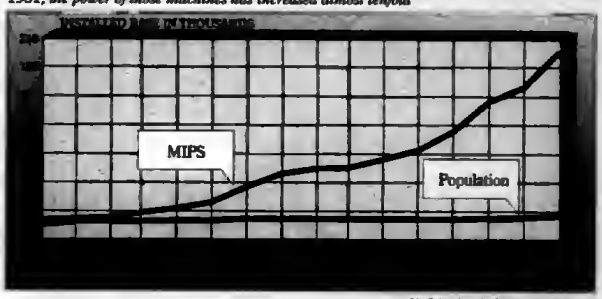
SMP allows each CPU in a multiprocessor to carry on its own I/O functions. In asymmetrical multiprocessing, as performed in dual-processing VAXs, I/O could only be handled by one of the CPUs, called the master.

The key to DEC's symmetrical multiprocessing is not to be found in any hardware component but rather in Version 5 of the VMS operating system, which

Continued on page 68

Power boost

While the installed base of IBM and plug-compatible mainframes has grown 51% since 1981, the power of those machines has increased almost tenfold



SOURCE: COMPUTER INTELLIGENCE
CW CHART

Although its mid-range leadership is not as clear-cut as that of IBM in large systems, DEC is increasingly viewed as the pacesetter for departmental computing. Just as IBM is providing its mainframe users a growth path of power and function, DEC is similarly providing upward paths for its largest users.

Most observers agree that if DEC is unable to make inroads into IBM territory, it will at least keep its largest users satisfied and remove from them the temptation of switching to IBM in search of more power.

However, all minicomputer vendors, DEC included, faced growing competition from personal computer local-area net-

Major events

• **October 1987:** One day after Wall Street's Black Monday, IBM announces the System/36 Model 5363, the last of the System/36s. While other System/36s are superseded by the Application System/400, the 5363 remains the entry-level system to the AS/400 line.

ETA announces its low-end Models P and Q.

• **February 1988:** IBM announces the MVS/ESA operating system, which boosts addressing to 16 terabytes. Also announced are the 3090 280E and 500E and the 4381-91E and 92E, which can run ESA.

Alliant announces its second-generation systems, FX/40 and FX/80. Cray introduces Y/MP/832.

• **March:** DEC begins a series of announcements with the introduction of symmetrical multiprocessing to its VAX line with VMS Version 5.0; the 8800 series, code-named Polar Star; and the 6200 series, code-named Calypso.

Convex announces its C series of parallel processors. Unisys unveils its 2200/400 series of mid-range systems, compatible with the former Sperry 1100 series.

• **April:** Amdahl announces its 5990 systems, with more MIPS than IBM's 3090 E models.

• **May:** Cray introduces X-MP EA.

• **June:** Two years of speculation about Silverlake end with IBM's announcement of the AS/400.

• **July:** DEC builds on earlier announcements, rolling out DEC TP, a suite of transaction processing software, and the SA-600, DEC's largest and fastest storage subsystem ever.

IBM announces 3090 S models, with more than 100 MIPS. MVS/ESA ships.

• **September:** Unisys replaces the 1100 line with 2200 models. NAS overhauls its product line with 10 new models.

IBM announces three new 9370 models and drastically re-prices the beleaguered line of mid-range systems.

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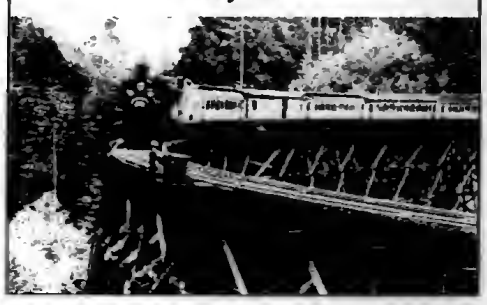

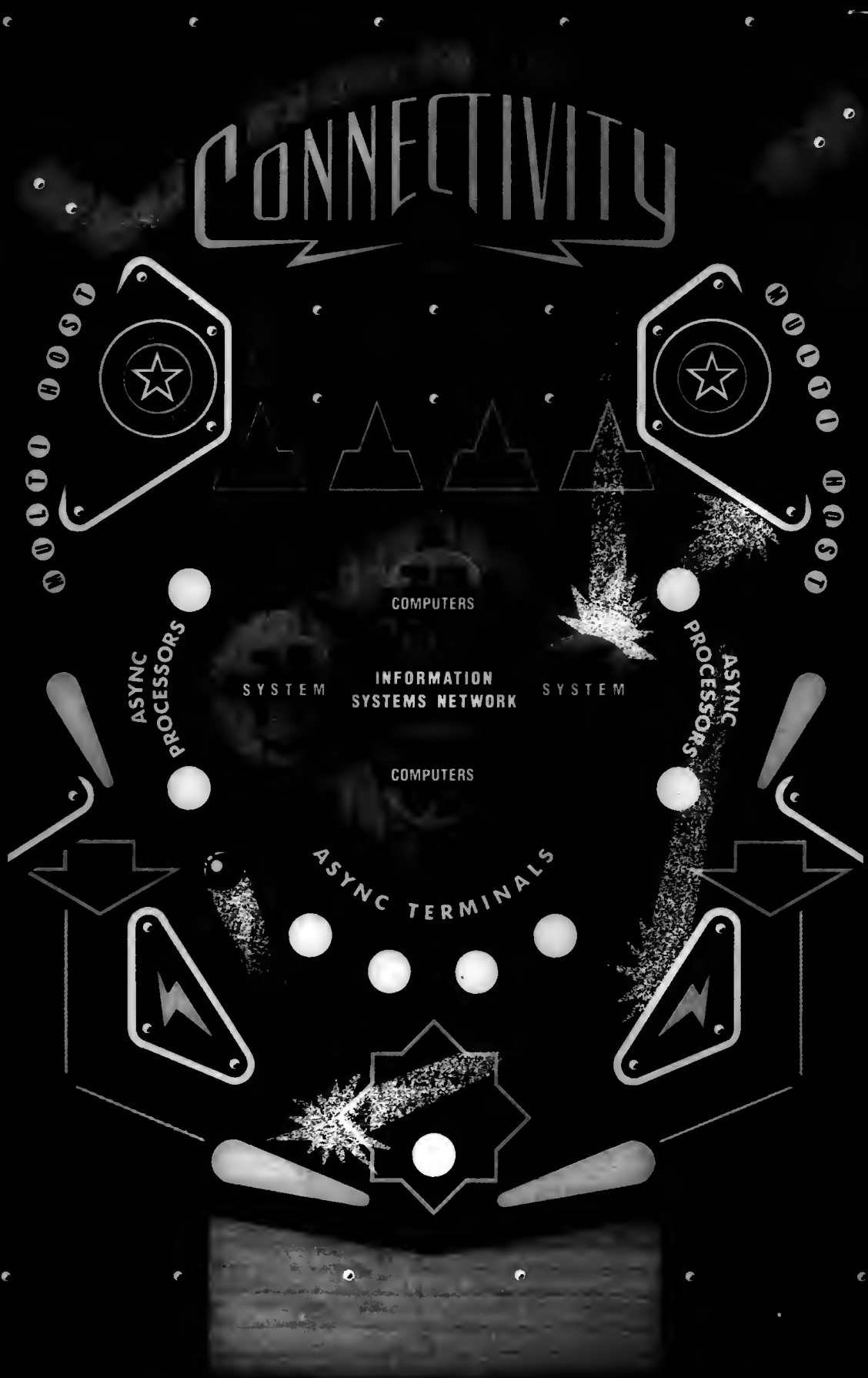
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INFORMATION SYSTEMS NETWORK
SYSTEM
ASYNC PROCESSORS
COMPUTERS
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The 6500 Multifunction Communication System from AT&T

If your 3270 system can make the right connections, you win. If not, you lose. Only it's not a game.

6500 SYSTEM DISPLAY

If your 3270 workgroups aren't getting the highest level of flexible functionality, you should be talking to AT&T about the 6500 Multifunction Communication System.

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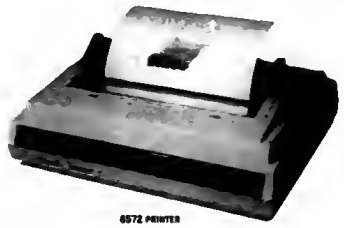
There's only one way to protect yourself: keep up with today's demands on your 3270-compatible system while you invest in a trouble-free future.



6572 PRINTER

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With the AT&T 6500 System you can instantly transfer data between windows, thereby transferring data between sessions or hosts. By eliminating the communications "Tower of Babel," the 6500 System lets users concentrate on the tasks that really matter.

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- IBM[1]3270 plug compatibility.
- Functionality that includes: SNA/SDLC, 3270 BSC; Netview compatible, Protocol Conversion, X.25, Async access and others.

6500 SYSTEM DISPLAY

- As many as three simultaneous connections to synchronous host computers (one local and two remote, or three remote) with no changes to the applications software on the host. And all on one controller.
- Ability to add up to 32 synchronous devices, including PCs, displays, printer controllers, and printers.
- Ability to add up to 32 asynchronous devices, including minicomputers, PCs with async emulation packages, displays, and modems for dial-in.

6544 CONTROLLER

- Multi-host, multi-tasking windows. Users can bring data from multiple hosts (or multiple sessions with the same host) into four multi-tasking windows – all regardless of the type of host accessed.
- A choice from nine different types of displays. (Four are plug compatible with IBM 3270 controllers.)
- Cable and wiring flexibility. Host devices can be connected to the 6500 System through inexpensive twisted-pair wiring – or you can use coax.

Tomorrow's computing systems.

Computer technology is changing every day. And tomorrow's corporate workgroups will be even more diverse and decentralized. Forward-thinking MIS managers can protect their investments and plan for the future with the AT&T 6500 Multifunction Communication System. Its flexibility, transparency, and expandability will prepare you for anything the future has to offer.

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Course tally

FROM PAGE 65

allows from one to four CPUs to function as peers.

Following Polar Star by a month and a half, its SMP cousin, the 6200 Calypso series, replaced the middle of the VAX line. Based on the CMOS Microvax 3000 microprocessor, the 6200 series is offered in versions containing from one to four processors. The promise of better transaction processing performance for the VAX line was fulfilled in July when DEC TP — a suite of OLTP software for VAXs — was announced.

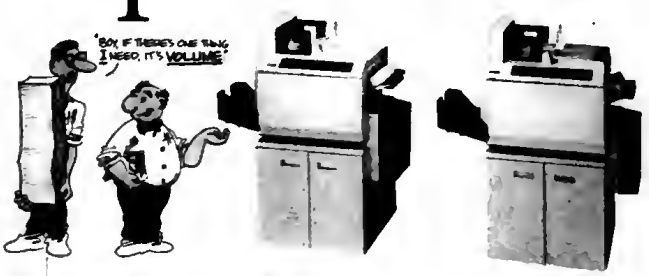
Also introduced at that time was the SA600, a storage array using the RA90 disk drive as a building block. While still trailing the best IBM disks, the DASD filled a gaping hole for DEC by providing major-league storage to large commercial users.

The significance of this series of announcements for DEC remains unclear. While some DEC accounts have been clamoring for better OLTP — "They have been pests," Olsen says — non-DEC accounts, particularly IBM ones, will likely be slow to warm to DEC as an OLTP provider.

To counter, IBM took the wraps off the much-anticipated AS/400. The processor's proprietary OS/400 operating system closely resembles IBM's System/38 CPF operating system while including ease-of-use features of the System/36's SSP operating system. OS/400 will run System/38 programs unchanged

Continued on page 79

How to turn up the volume without turning up the noise.



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How it works

The Hardware Roundup charts, which will continue in the Oct. 3 issue with small systems, personal computers and workstations, are intended as a guide for readers interested in comparing products from major vendors in various size and price classes.

Computerworld has tried to present complete and accurate listings of as many products as possible, contacting vendors directly for information. Space does not permit inclusion of all products or vendors in each category.

Where possible, the parameters used to group computer systems with their likely competitors were defined in the following manner:

Although vendors' figures reflected an overlap in number of users from one category to another, large systems typically cost more than $1 million and support 125 to more than 1,000 users. Medium-scale systems normally support 50 to 300 users and are priced in the $100,000 to $1 million range. Special-purpose systems are typically high-speed scientific computers.

Comparing computers made by different vendors, or even within a single company in the cases of multiproduct-line companies, has never been easy. Many who evaluate systems are looking for a set of numbers showing how all types of computers handle a particular, well-defined set of tasks.

In the absence of such a set of numbers, the latest edition of CW's annual Hardware Roundup includes MIPS — either provided by vendors or, based on vendors' claims, estimated by CW — and other performance numbers supplied by vendors in response to a questionnaire. Those other numbers indicate millions of floating-point operations per second and Dhrystone, ET1 Debit/Credit, Linpack and Livermore Loops benchmarks. The goal was to show how systems perform in selected environments. •

France...The Channel waters are black with shipping, as reinforcements and supplies are funnelled ashore for the conquest of the Cherbourg Peninsula. (Credit: Bettmann)

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Large systems

COMPANY	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS[2])	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTE/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN-RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
Control Data Corp. (800) 328-8513, ext. 100	Cyber 900 and 990	August 1988	DP, OA, SE	IBM 3090 Model 180E, 200E	34.9-62.3	50 (S); 62.6 (P)	13 LP (actual)	16	64-256	1.3-12	NP	Eight-32	MOS/VE, NOS, NOS/BE	Ethernet	Unlmt./256	64	$1.0 million with 64M byte memory, 32K-byte cache, 24 channels, power supplies
	Cyber 980 and 960	July 1988	DP, SE, OA	IBM 3090 Model 150E, 4381 Model 92E, VAX 8840	6.9-30.7	NP	1.6-3 LP (actual); 1.7-3.1 LL (actual)	32	32-256	1.3-12	NP	Eight-32	MOS/VE, NOS, NOS/BE	Ethernet	Unlmt./160	64	$630,500 with 32M bytes memory, 32K-byte cache, 24 standard channels, power supplies
Digital Equipment Corp. Contact local sales office	VAX 8820	March 1988	EP, OA, SE, TP	NA	12***	NP	NP	45	128-512	2.8	NP	NP	VMS, Ultrix-32	Ethernet	NP/124-564	32	$904,350 with 128M bytes memory, VAX cluster port, operating system
	VAX 8830	March 1988	DP, OA, SE, TP	NA	17***	NP	NP	45	128-512	2.8	NP	NP	VMS	Ethernet	NP/168-756	32	$1.18 million with 128M bytes memory, VAX cluster port, operating system
	VAX 8840	March 1988	DP, OA, SE, TP	NA	22***	NP	NP	45	128-512	2.8	NP	NP	VMS	Ethernet	NP/180-816	32	$1.6 million with 128M bytes memory, VAX cluster port, operating system
	VAX 8842	March 1988	DP, OA, SE, TP	NA	22***	NP	NP	45	256-1,024	2.8	NP	NP	VMS	Ethernet	NP/124-552	32	$1.736 million with 256M bytes memory, operating system, VAX cluster port, Ethernet port, 2.5G bytes storage array, storage controller, interface for 4 disk drives
	VAX 9874	1987	DP, OA, SE, TP	NA	24***	NP	NP	45	192-2,048	2.8	NP	NP	VMS	Ethernet	NP	32	$2.97 million with 192M bytes memory, operating system, 2.5G byte storage array, terminal, 2 four-port interfaces, tape drive, VAX cluster console system, storage controller
	VAX 8978	1987	DP, OA, SE, TP	NA	45***	NP	NP	45	384-4,096	2.8	NP	NP	VMS	Ethernet	NP	32	$5.56 million with 384M bytes memory, operating system, terminal, 24 four-port disk interfaces, 4 storage controllers, VAX cluster console system
Edge Computer Corp. (609) 561-3039	Edge 3000 series (one to four CPUs)	Scheduled for September 1988	DP, OA, TP	DEC 8640, 8650	NP	6 (S)	NP	48	8-16	NP	NP	Five	Unix, Pick	Ethernet	Up to 1,800/ 250-900	64	NP
Honeywell Bull, Inc. (800) 328-5111, ext. 99	DPS 90/91	Fourth-quarter 1984	DP, SE, TP	IBM 3090 Model 180S	NP	27 (P)	164 DC (estimate); 5 LP (actual); 3.84 LL (actual)	NP	32-128	NP	16	32	GCOS8	Ethernet	NP/1,270	36	$3.55 million with CPU, SCUs[4] with 32M bytes memory, IOP[5], system control center, power supplies
	DPS 90/92	Second-quarter 1985	DP, SE, TP	IBM 3090 Model 300E	NA	54 (P)	300 DC (estimate); 10 LP (actual); 7.68 LL (actual)	NP	32-128	NP	32	64	GCOS8	Ethernet	NP/2,295	36	$4.5 million with 2 CPUs, SCUs with 32M bytes memory, IOP, system controller, power supplies
	DPS 90/92T	Third-quarter 1988	DP, SE, TP	IBM 3090 Model 300E	NA	54 (P)	300 DC (estimate); 10 LP (actual); 7.68 LL (actual)	NP	64-256	NP	32	64	GCOS8	Ethernet	NP/2,295	36	$5.63 million with 2 CPUs, 2 SCUs with 32M bytes memory each, 2 IOP, 2 system control centers, power supplies
	DPS 90/93	Third-quarter 1988	DP, SE, TP	IBM 3090 Model 400E	NA	81 (P)	450 DC (estimate); 15 LP (actual); 11.53 LL (actual)	NP	64-256	NP	48	96	GCOS8	Ethernet	NP/3,440	36	$6.5 million with 3 CPUs, 2 SCUs with 32M bytes memory each, 3 IOP, 2 system control centers, power supplies
	DPS 90/94	Fourth-quarter 1988	DP, SE, TP	IBM 3090 Model 300E	NA	104 (P)	530 DC (estimate); 20 LP (actual); 15.36 LL (actual)	NP	64-256	NP	96	64	GCOS8	Ethernet	NP/4,050	36	$7.8 million with 4 CPUs, 2 SCUs with 32M bytes memory each, 4 IOP, 2 system controllers, power supplies
	DPS 8000/82	Third-quarter 1987	DP, TP	IBM 3090 Model 180E	NA	NP	110 DC (estimate)	NP	32-256	NP	NP	32	GCOS8	Ethernet	NP/830	36	$1.3 million with 2 CPU, 2 SCUs with 16M bytes memory each, 1 IOP, 2 consoles, 2 service processors, 2 modems, power supplies
	DPS 8000/83	Third-quarter 1988	DP, TP	IBM 3090 Model 180S	NA	NP	152 DC (estimate)	NP	32-256	NP	NP	48	GCOS8	Ethernet	NP/1,164	36	$1.835 million with 2 CPUs, 2 SCUs with 16M bytes memory each, 2 IOP, 2 consoles, 2 service processors, 2 modems, power supplies
	DPS 8000/84	Third-quarter 1988	DP, TP	IBM 3090 Model 300E	NA	NP	192 DC (estimate)	NP	32-256	NP	NP	64	GCOS8	Ethernet	NP/1,470	36	$2.37 million with 4 CPUs, 2 SCUs with 16M bytes memory each, 4 IOP, 2 consoles, 2 service processors, 2 modems, power supplies
IBM (800) 426-2623	[illegible] Model 130E	September 1987	DP, OA, SE, TP	NA	7.4[6]	130 million per processor (P)	NP	18.5	32	3-4.5[7]	NP	16-24	MVS, VM	Both	NP	32	$668,000
	[illegible] Model 200E	April 1987	DP, OA, SE, TP	NA	16[6]	130 million per processor (P)	NP	17.75	32-64	3-4.5[7]	NP	16-24	MVS, VM	Both	NP	32	$1.65 million
	[illegible] Model 180E	April 1987	DP, OA, SE, TP	NA	16.4[6]	71 (S); 130 million per processor (P)	90 LP (actual)	17.5	32-64	3-4.5[7]	NP	16-32	MVS, VM	Both	NP	32	$2.4 million

*Based on *Computerworld* estimates.
**Using Argonne National Laboratory vector unrolling technique and Add/Multiply Assist Microcode.
***One DEC MIPS equals the performance of the VAX 11/780.
[1]Commercial data processing (DP); scientific/engineering (SE); office automation (OA); on-line transaction processing (TP).
[2]Full-precision millions of floating-point operations per second (MFLOPS). Sustained (S); peak (P).
[3]Per-second performance ratings, based on the following industry-standard benchmarks: Dhrystone, Version 1.1, peephole optimization only (DH); Debit/Credit (ET1) transactions based on 95% subsecond responses (DC); Linpack 100 x 100 full-precision in MFLOPS (LP); Livermore Loops harmonic mean, 14 loops (LL). Vendors supplied either actual or estimated benchmark figures.
[4]System Control Units
[5]Input-Output Processor

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
IBM (800) 426-3333	ES/3090 Model 200E	Second-quarter 1988	DP, OA, SE, TP	NA	20*	141 (S), 130 million per processor (P)	NP	17.3	64-128	3-4.5*	NP	16-64	MVS, VM	Both	NP	32	$4.9 million
ES/3090 Model 200E	April 1987	DP, OA, SE, TP	NA	20.5*	130 (S), 130 million per processor (P)	NP	17.2	64-128	3-4.5*	NP	16-64	MVS, VM	Both	NP	32	$0.5 million
ES/3090 Model 200E	July 1987	DP, OA, SE, TP	NA	46.5*	266 SE, 130 million per processor (P)	NP	17.2	64-128	3-4.5*	NP	16-64	MVS, VM	Both	NP	32	$9 million
ES/3090 Model 400E	January 1987	DP, OA, SE, TP	NA	69.7*	270 (S), 130 million per processor (P)	NP	17.2	128-256	3-4.5*	NP	64-128	MVS, VM	Both	NP	32	$8.375 million
ES/3090 Model 200E	Third-quarter 1988	DP, OA, SE, TP	NA	70.4*	283 SE, 130 million per processor (P)	NP	17.3	128-256	3-4.5*	NP	64-128	MVS, VM	Both	NP	32	$8.65 million
ES/3090 Model 200E	July 1987	DP, OA, SE, TP	NA	70*	307 SE, 130 million per processor (P)	NP	17.2	128-256	3-4.5*	NP	64-128	MVS, VM	Both	NP	32	$10.9 million
ES/3090 Model 120E	September 1988	DP, OA, SE, TP	NA	7.4*	130 million per processor (P)	NP	18.5	32-64	3-4.5*	NP	16-32	MVS, VM	Both	NP	32	$600,000
ES/3090 Model 120E	September 1988	DP, OA, SE, TP	NA	11.5*	130 million per processor (P)	NP	17.75	32-64	3-4.5*	NP	16-32	MVS, VM	Both	NP	32	$1.05 million
ES/3090 Model 170E	Fourth-quarter 1988	DP, OA, SE, TP	NA	14.4*	133 million per processor (P)	NP	17.75	32-64	3-4.5*	NP	16-32	MVS, VM	Both	NP	32	$1.1 million
ES/3090 Model 150E	Fourth-quarter 1988	DP, OA, SE, TP	NA	20.5*	88 (S), 130 million per processor (P)	16 LP (scalar)	15	32-128	3-4.5*	NP	16-32	MVS, VM	Both	NP	32	$1.85 million
ES/3090 Model 200E	Fourth-quarter 1988	DP, OA, SE, TP	NA	36.5*	130 (S), 130 million per processor (P)	NP	15	64-256	3-4.5*	NP	32-64	MVS, VM	Both	NP	32	$5.4 million
ES/3090 Model 300E	Fourth-quarter 1988	DP, OA, SE, TP	NA	30.5*	184 SE, 130 million per processor (P)	NP	15	64-256	3-4.5*	NP	32-64	MVS, VM	Both	NP	32	$4.9 million
ES/3090 Model 300E	Fourth-quarter 1988	DP, OA, SE, TP	NA	36.5*	272 (S), 130 million per processor (P)	NP	15	64-256	3-4.5*	NP	32-64	MVS, VM	Both	NP	32	$6.7 million
ES/3090 Model 400E	Fourth-quarter 1988	DP, OA, SE, TP	NA	72.3*	364 SE, 130 million per processor (P)	NP	15	128-512	3-4.5*	NP	64-128	MVS, VM	Both	NP	32	$9.5 million
ES/3090 Model 600E	Fourth-quarter 1988	DP, OA, SE, TP	NA	97.5*	430 SE, 130 million per processor (P)	NP	15	128-512	3-4.5*	NP	64-128	MVS, VM	Both	NP	32	$10.95 million
ES/3090 Model 400E	Fourth-quarter 1988	DP, OA, SE, TP	NA	105*	518 (S), 130 million per processor (P)	NP	15	128-512	3-4.5*	NP	64-128	MVS, VM	Both	NP	32	$12.4 million
ICL PLC 061-223-1301 (Manchester, England)	Series 39 Level 80/3	September 1987	DP, TP	IBM 3090 Model 200E	51	NP	130 DC (estimate)	25	48-384	3	NP	Nine-27	VME	Ethernet	8,000+/ 4,500	32	$4.147 million with 48M bytes memory
Series 39 Level 80/4	July 1988	DP, TP	IBM 3090 Model 300E	67	NP	NP	25	64-512	3	NP	12-36	VME	Ethernet	8,000+/ 6,400	32	$5.576 million with 64M bytes memory
Series 39 Level 80/1	November 1985	DP, TP	IBM 3090 Model 150E; VAX 8978	17.5	NP	53 DC (estimate)	25	32-128	3	NP	Three-nine	VME	Ethernet	8,000+/ 1,800	32	$1.454 million with 32M bytes memory
Series 39 Level 80/2	November 1986	DP, TP	IBM 3090 Model 200	34	NP	100 DC (estimate)	25	32-256	3	NP	Six-18	VME	Ethernet	8,000+/ 3,200	32	$2.77 million with 32M bytes memory
Series 39 Level 80/1	August 1986	DP, TP	IBM 3090 Model 120E; VAX 8830	7.1	NP	36 DC (estimate)	25	16-64	3	NP	Three-nine	VME	Ethernet	8,000+/ 1,200	32	$7.83 million with 16M bytes memory
Series 39 Level 60/2	August 1987	DP, TP	IBM 3090 Model 180E; VAX 8978	14	NP	68 DC (estimate)	25	32-128	3	NP	Six-18	VME	Ethernet	8,000+/ 2,200	32	$1.616 million with 32M bytes memory
Harbond Advanced Systems (404) 979-1000	AS/EX 10	First-quarter 1988	DP, SE	IBM 4381	4.7	NP	NP	30	32-256	3-6	NP	Eight-32	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
AS/EX 20	Second-quarter 1987	DP, SE	IBM 4381	6.3	NP	2.3 LP	30	32-256	3-6	NP	Eight-32	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
AS/EX 30	Second-quarter 1987	DP, SE	IBM 3090	8.3	NP	2.9 LP	30	32-256	3-6	NP	Eight-32	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
AS/EX 50	Second-quarter 1987	DP, SE	IBM 3090	13	NP	4.8 LP	30	32-256	3-6	NP	Eight-32	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
AS/EX 30	First-quarter 1989	DP, SE	IBM 3090	11	NP	NP	30	32-256	3-6	NP	Eight-32	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
AS/EX 40	Third-quarter 1989	DP, SE	IBM 3090	21.7	NP	NP	30	32-256	3-6	NP	Eight-32	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP

VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
National Advanced Systems (408) 970-1000	AS/EX 90	Fourth-quarter 1986	DP, SE	IBM 3090	22.3	NP	NP	16.6	64-1G	3-6	NP	16-48	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	60	NP
	AS/EX 60	Second-quarter 1988	DP, SE	IBM 3090	28.3	212 (P)	60 LP, 9.73 LL (scalar), 11.16 LL (vector) (24 formats)	16.5	64-1G	3-6	NP	32-64	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
	AS/EX 65	Second-quarter 1988	DP, SE	IBM 3090	60	NP	NP	16.5	256-3G	3-6	NP	32-96	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	60	NP
	AS/EX	First-quarter 1987	DP, SE	IBM 3090	40.2	NP	NP	16.5	64-1G	3-6	NP	32-64	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
	AS/EX 72	NP	DP, SE	IBM 3090	49.6	NP	NP	16.5	256-3G	3-6	NP	64-160	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	60	NP
	AS/EX 66	Second-quarter 1988	DP, SE	IBM 3090	50.9	NP	NP	16.5	64-1G	3-6	NP	32-64	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
	AS/EX 66	Fourth-quarter 1988	DP, SE	IBM 3090	70	NP	NP	16.5	128-2G	3-6	NP	48-128	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	60	NP
	AS/EX 65	NP	DP, SE	IBM 3090	70	NP	NP	16.5	256-2G	3-6	NP	64-128	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
	AS/EX 100	NP	DP, SE	IBM 3090	88	NP	NP	16.5	256-2G	3-6	NP	64-128	MVS, MVS/XA, VM, VM/XA, MVS/ESA	NP	NP	32	NP
Prime Computer, Inc. (508) 655-8000	6550	December 1988	DP, SE, OA, TP	VAX 8230, 8240	23.6	NP	NP	44	32-128	2.46	Eight	Two	Primos	Both	960/200+	32	$804,000 with 32M bytes memory, 770M-byte disk, system console, Primos
Tandem Computers, Inc. (408) 725-6000	Nonstop VLX80s	May 1987	TP	IBM 3090 Model 180S, 600S	54-96	NP	58-300 DC (actual)	83.3	128-512	1.3-1.8	NP	Eight-32	Guardian 90	NP	NP/NP	60	$2.025 million with 2 VLX processors, 64M bytes memory, 2.7G-byte disk, tape drive, 6530 terminal, power supplies, 6100E communications subsystem
Unisys Corp. (215) 542-4011	AE12E	May 1988	DP, TP	IBM 4381 14	NP	NP	NP	65	24-72	3	NP	32-48	MCP/AS	NP	NP/NP	48	$795,000 with 24M bytes memory, console, I/O subsystem, power supply
	A12	August 1986	DP, TP	IBM 3090 Model 150E	NP	NP	NP	65	24-144	3	NP	32-48	MCP/AS	NP	NP/NP	48	$1.3 million with 24M bytes memory, console, I/O subsystem, power supply
	A12T	May 1988	DP, TP	IBM 3090 Model 180E	NP	NP	NP	65	24-144	3	NP	48-64	MCP/AS	NP	NP/NP	48	$1.65 million with 24M bytes memory, console, I/O subsystem, power supply
	A17F	May 1988	DP, TP	IBM 3090 Model 180E	NP	NP	NP	65	48-288	3	NP	64-128	MCP/AS	NP	NP/NP	48	$3.13 million with 48M bytes memory, console, I/O subsystem, power supply
	A17H	May 1988	DP, TP	IBM 3090 Model 300E	NP	NP	NP	65	48-288	3	NP	64-128	MCP/AS	NP	NP/NP	48	$4.42 million with 48M bytes memory, console, I/O subsystem, power supply
	A17L	June 1988	DP, TP	IBM 3090 Model 400E	NP	NP	NP	65	48-576	3	NP	16-256	MCP/AS	NP	NP/NP	48	$7.31 million with 96M bytes memory, console, I/O subsystem, power supply
	A17N	June 1988	DP, TP	IBM 3090 Model 500E, 600E	NP	NP	NP	65	48-572	3	NP	16-256	MCP/AS	NP	NP/NP	48	$8.65 million with 96M bytes memory, console, I/O subsystem, power supply
	1100/91 SV Model II	January 1988	DP, TP	IBM 4381 14	NP	NP	NP	30	8-64	2.5	NP	64-256	OS/1100	NP	NP/NP	72	$1.16 million with 8M bytes memory, cabinet, 4 channels, power and cool units
	1100/91 Model II	July 1987	DP, TP	IBM 3090 Model 120E, 150E	NP	NP	NP	30	32-64	2.5	NP	Four-172	OS/1100	NP	NP/NP	72	$1.87 million with 32M bytes memory, console, 4 channels, power and cool units
	1100/92 SV Model II	January 1988	DP, TP	IBM 3090 Model 150E	NP	NP	NP	30	32	2.5	NP	Four-86	OS/1100	NP	NP/NP	72	$2.27 million with 32M bytes memory, console, 4 channels, power and cool units
	1100/92 Model II	July 1987	DP, TP	IBM 3090 Model 180E	NP	NP	NP	30	32-64	2.5	NP	Four-176	OS/1100	NP	NP/NP	72	$2.82 million with 32M bytes memory, cabinet, 4 channels, power and cool units
	1100/93 Model II	July 1987	DP, TP	IBM 3090 Model 200E, 280E	NP	NP	NP	30	32-64	2.5	NP	Four-172	OS/1100	NP	NP/NP	72	$3.85 million with 32M bytes memory, console, 4 channels, power and cool units
	1100/94 Model II	July 1987	DP, TP	IBM 3090 Model 200E, 280E	NP	NP	NP	60	32-64	2.5	NP	Four-172	OS/1100	NP	NP/NP	72	$4.34 million with 32M bytes memory, console, 4 channels, power and cool units
	1100/94 Model II Turbo	First-quarter 1989	TP	IBM 3090 Model 200E, 300E	NP	NP	NP	30	64	2.5	NP	Four-172	OS/1100	NP	NP/NP	72	$7.3 million with 64M bytes memory, consoles, 8 channels, power and cool units
	2200/600	NP	DP, SE, TP	IBM 3090	2.2 times the 1100/90	NP	NP	15	32-128	3-33	NP	176	OS/1100	Ethernet	NP	36	$1.96 million

Medium-scale systems

VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS, MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
Ardi Corp. (408) 428-1500	System 68k	January 1987	DP, TP, OA	IBM 9370-80, DEC 8800, 6200	3.5-7.4	NP	8800 DH (actual), 17-68 DC (actual)	30	4-64	2.4-4.8	212	5	Unix System 5, Release 3	Ethernet	128+/16-30	32	$93,000
	System 880	November 1984	DP, OA, TP	IBM 9370-90, DEC 8800, 6200	3.5-7.4	NP	8800 DH (actual), 17-30 DC (actual)	30	4-64	2.4-4.8	340	8	Unix V.3	Ethernet	200+/16-30	32	$80,000
AT&T (201) 221-3000	3B4000	March 88	TP	IBM 9370 Model 90, AS/400 Model 80, 4381, DEC VAX 8600, 8200, 6550	NP	NP	NP	NP	8-340	7-16.8	440	NP	Unix System V	Ethernet	440/300	32	$146,000 with 4M bytes memory, cabinet, 300M-byte boot disk, 110M-byte tape, operating system
CXI Systems, a C. Itoh Electronics Co. (714) 660-1200	CXI/80 Model 6020-6027	October 1987	DP	IBM 9370	5	NP	NP	60	4-8	2.5	120	NP	Pick	No	248/100	16	$120,000 with 4M bytes memory, 600M-byte hard disk with 4M bytes cache memory, tape drive, 32 intelligent ports, console, CRT and cable, power supplies, diagnostics, manuals, cabinet, Pick, 15-slot chassis
Computer Consoles, Inc. (714) 458-7282	Power 6/32 Series	1984	OA	DEC VAX	3-15	NP	9526 DH (actual), 3210 LP (actual)	100	4-128	NP	32-384	NP	Unix System V	Ethernet	200/100	32	$70,000 and up
Control Data Corp. (800) 553-2518 ext. 100	Cyber 930 and 932	March 1987	DP, OA, SE	DEC VAX 8600, 8650, IBM 4381-P14, 4877	3-6	NP	20-50 LP (actual), 3000-6400 LL (actual)	60	8-128	1.8-5	NP	32	NOS/VE	Ethernet	NP/32	60	$80,000 with 4M bytes memory, 32K bytes cache, 12 standard channels, power supplies
Convergent Technologies, Inc. (408) 434-3848	S/640	September 1987	OA	DEC VAX 3600	4.2***	NP	NP	120	4-32	0.63-3	48-120	2-10	CTIX	Ethernet	64/32	64	$42,500 with 4M byte memory, 190M-byte disk, 22 RS232 ports, I/O processor, 32-user CTIX System, 90M-byte cartridge tape
	S/80	June 1986	OA	IBM RT, DEC VAX 8350	2.2***	NP	NP	300	2-6	up to 3	8 or 16	2	CTIX	Ethernet	16/12	32	$8,930 with 2M bytes memory, 40M-byte disk, 8 RS232 ports, 60M-byte tape drive, 1 parallel port, CTIX
Data General Corp. (800) 328-0211	MV/15000 Model 30	December 1986	DP, OA, SE, TP	DEC VAX 8250	4.6	0.3976 (S)	4673 DH (actual)	30	8-32	NP	416	1	AOS/VS, DG/UX, AOS/RT32	Ethernet	256/60-120	32	$122,160 with 4M bytes memory, operating system RTU, 1 channel
	MV/15000 Model 60	December 1986	DP, OA, SE, TP	DEC VAX 8250	4.6	0.7266 (S)	8800 DH (actual)	30	16-64	NP	432	1	AOS/VS, DG/UX, AOS/RT32	Ethernet	384/60-160	32	$200,300 with 16M bytes memory, operating system RTU, 1 channel
	MV/15000 Model 1	March 1988	DP, OA, SE, TP	DEC VAX 8810	6.6	1.676 (S)	8800 DH (actual)	30	16-64	NP	8000	5	AOS/VS, DG/UX, AOS/RT32	Ethernet	400/160-200	32	$301,400 with 16M bytes memory, 2 I/O channels, operating system RTU
	Eclipse MV/20000 Model 3	September 1986	DP, OA, SE, TP	DEC VAX 8600	14.3	1.676 (S)	15800 DH (actual)	30	16-64	NP	1008	5	AOS/VS	Ethernet	800/150-300	32	$464,400 with 2 CPUs, 16M bytes memory, I/O channels, operating system RTU
Datapoint Corp. (512) 699-7000	7950 Multi-Processor System	June 1986	DP, OA, TP	IBM 9370	8-34	NP	NP	50	16-128	1.5	1,024	12	NP	No	300/80	32	$149,800 with 16M bytes memory, dual symmetric CPUs, 565M-byte disk, 150M-byte tape drive, dual Arcnet LAN interface
Digital Equipment Corp. Contact local sales office	VAX 6000	March 1987	DP, OA, SE, TP	NA	2.3***	NP	NP	100	32-128	2.5	NP	NP	VMS, Ultrix-32	Ethernet	30/24-60	32	$120,700 with 32M bytes memory, operating system
	VAX 8530	March 1987	DP, OA, SE, TP	NA	4***	NP	NP	80	32-128	2.5	NP	NP	VMS, Ultrix-32, VAXELN	Ethernet	NP/48-192	32	$247,300 with 32M bytes memory, operating system
	VAX 8600	August 1985	DP, OA, SE, TP	NA	6***	NP	NP	45	48-256	2.5	NP	NP	VMS, Ultrix-32, VAXELN	Ethernet	NP/72-324	32	$407,200 with 48M bytes memory, operating system
	VAX 8250	April 1986	DP, OA, SE, TP	NA	2.5***	NP	NP	80	32-256	2.5	NP	NP	VMS, Ultrix-32	Ethernet	NP/40-160	32	$175,300 with 32M bytes memory, operating system
	VAX 8530	April 1986	DP, OA, SE, TP	NA	5.5***	NP	NP	80	64-256	2.5	NP	NP	VMS, Ultrix-32	Ethernet	NP/70-512	32	$350,200 with 64M bytes memory, operating system
	VAX 8550	April 1986	DP, OA, SE, TP	NA	6.5***	NP	NP	80	64-256	2.5	NP	NP	VMS	Ethernet	NP/100-444	32	$300,600 with 64M bytes memory, operating system
	VAX 8650	April 1986	DP, OA, SE, TP	NA	11***	NP	NP	80	128-256	2.5	NP	NP	VMS	Ethernet	NP/150-300	32	$644,000 with 128M bytes memory, operating system
	VAX 8810	March 1988	DP, OA, SE, TP	NA	6***	NP	NP	80	48-512	2.5	NP	NP	VMS	Ethernet	NP/72-324	32	$699,400 with 48M bytes memory, operating system
Edge Computer Corp. (602) 951-2020	Edge 1000 Series	January 1986	DP, TP	DEC VAX 8650, 8800	6-11	1.3-2.5 (S)	NP	130	8-64	NP	Up to 500	5	Unix V.2, Pick OA	Ethernet	500/120-200	64/32	$200 000 with 16M bytes memory, 592M-byte disk, Unix, 32 ports
Encore Computer Corp. (800) 626-6300	Multimax 310/320	February 1986	SE	DEC VAX Models 8600-8650	4-40	NP	NP	60	8-128	61.5	Un-limited	3	Unix System V, BSD 4.2	Ethernet	1000/320	32	$80,000
Fujitsu Microsystems of America (408) 434-1160	Series 2000 system 2600/model 80	July 1988	DP, OA, SE, TP	NA	NP	NP	NP	NP	4-16	333	32-160	NP	Pick	NP	160/32-100	32	$149,000 with 4M bytes memory, 338M-byte disk, 32 ports, 64M-byte tape, tape drive, operating system

* Based on *Computerworld* estimates.
** Using Argonne National Laboratory vector unrolling technique and A64/Multiply Assist Microcode.
***One DEC MIPS equals the performance of the VAX 11/780.
[1]Commercial data processing (DP); scientific/engineering (SE); office automation (OA); on-line transaction processing (TP).
[2]Full-precision millions of floating-point operations per second (MFLOPS) Sustained (S); peak (P).
[3]Per-second performance ratings, based on the following industry-standard benchmarks: Dhrystone, Version 1.1, peephole optimization only (DH); Debit/Credit (ET1) transactions based on 95% subsecond responses (DC); Linpack 100 x 100 full-precision to MFLOPS (LP); Livermore Loops harmonic mean, 14 loops (LL). Vendors supplied either actual or estimated benchmark figures.

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
Bustle Computer Systems Division (800) 4-Bustle	MCE S Model 70	January 1988	DP, SE	DEC VAX 8800	17.5	NA	10,000 DH (actual), 1,300 LP (actual), 1,646 LL (actual)	60	4-32	6MB/s-3.4	60	40	Unix System V	NP	96/64-100	32	$75,000 with two CPUs, two Floating Point processors, two 4K-byte caches, 4M bytes memory, 600M-byte diskette, 6 ports, 16-user Unix license, power supply
	MCE S Model 60	January 1988	DP, OA	DEC VAX 8550, 8530	10.5	NA	11,200 DH (actual), 6000 LP (actual), 134 LL (actual)	60	4-16	6MB/s-2.4M	60	34	Unix System V with real-time extensions	NP	64/32	16	$30,000 with CPU, Floating Point processor, 8K-byte cache, 4M bytes memory, 600M-byte diskette, power supply, 6 ports, 2-user Unix license
	MCE S Model 30	February 1987	SE	DEC Microvax	4.1	NA	6444 DH (actual), 3265 LP (actual), 392K LL (actual)	60	2-16	6MB/s-2.4M	32	16	Unix System V with real-time extensions	NP	32/2-16	32	$27,900 with CPU, Floating Point processor, 4K-byte cache, 2M bytes memory, 600M-byte diskette, power supply, three ports, 2-user Unix license
	HCX-9	May 1987	DP, SE, OA, TP	DEC 8700	5	.48 (S), .57 (P)	10,155 DH (actual)	100	4-128	2.48	256	60	HCX/UX (Unix)	NP	256/80	32	$195,500 with 4M bytes memory, 8 ports, 8 channels, console processor, CRT, modem, 32-user HCX/UX license, power supplies
	HCX-8	July 1987	DP, SE, OA, TP	DEC 8530	5	.28 (S), .52 (P)	4943 DH (actual)	100	4-32	2.48	32	8	HCX/UX (Unix)	NP	32/16	32	$134,500 with 4M bytes memory, 8 ports, 4 channels, console processor, CRT, modem, 32-user HCX/UX license, power supplies
	H-1200	June 1988	DP	NA	6	.85 (S)	.85M LP (actual)	75	12	2.4	224	31	RT-VOS/MP, RT-VOS, VOS, VUE (VOS/Unix environment)	NP	224/NA	32-96	$280,000
	H-1100	August 1987	SE	NA	6	.85 (S)	.85 LP (actual)	75	12	2.4	60	15	RT-VOS/MP, RT-VOS, VOS, VUE (VOS/Unix environment)	NP	224/NA	32-96	$200,000
	H-1000	January 1984	SE	NA	4.0	.57 (S)	.57M LP (actual)	75	12	2.4	192	31	RT-VOS/MP, RT-VOS, VOS, VUE (VOS/Unix environment)	NP	192/NA	32-96	$250,000
	H-900	August 1987	SE	NA	4.0	.57 (S)	.57M LP (actual)	75	12	2.4	60	15	RT-VOS/MP, RT-VOS, VOS, VUE (VOS/Unix environment)	NP	192/NA	32-96	$240,000
	H-1000	August 1987	SE	NA	10	1.7 (S)	1.7 LP (actual)	75	1.5-12	2.4	220	30	RT-VOS/MP, RT-VOS, VOS, VUE (VOS/Unix environment)	NP	220/NP	Up to 96	$600,000
	H-1000	September 1987	SE	NA	15	2.55 (S)	2.55 LP (actual)	75	1.5-12	2.4	416	60	RT-VOS/MP, RT-VOS, VOS, VUE (VOS/Unix environment)	NP	416/NP	Up to 96	$795,000
Hewlett-Packard Co. (800) 752-0900 Dept. 262E	HP 3000 Series 955	First half 1989	DP, TP	DEC VAX 8840, IBM 4381-22	11	NA	NP	40	64-128	NP	400+	12	MPE XL	802.3 local-area network	400/150-300	32	$990,000 with 64M bytes memory, operating system, HP SQL, 2 HP-IB channels, 1 LAN
	HP 3000 Series 950	September 1987	DP, TP	DEC VAX 8820, IBM 4381-22	7	NA	NP	73	64-128	NP	400	12	MPE XL	802.3 LAN	400/100-200	32	$270,000 with 64M bytes memory, operating system, HP SQL, 2 HP-IB channels, LAN
	HP 3000 Series 935	Second half 1988	DP, TP	DEC VAX 6230/6240, IBM AS/400 Model B60	5-6	NP	NP	67	48-96	NA	240	8	MPE XL	802.3 LAN	240/60-150	32	$150,000 with 48M bytes memory, operating system, HP SQL database, LAN, 2 HP-IB channels
	HP 3000 Series 70	April 1988	NP	DEC VAX 8550, 8810, IBM 9370-90, AS/400 Model B50, B60	NP	NP	NP	75	8-16	NP	400	15	MPE 5	NP	400/50-120	16	$160,000 with 5M bytes memory, operating system, 2 HP-IB channels
	HP 9000 Model 835SE	July 1988	OA, SE	DEC 6210	NP	2.02-2.60 (S)	19400-23400 DH (actual)	66	8-112	1-5	72	2	HP-UX	Ethernet	72/50-60	32	$99,000 with 64-user license, multiplexer card, HP IB card, 24M bytes memory, battery backup unit
	HP 9000 Model 855S	April 1988	DP, OA, SE	NA	NP	NP	NP	40	32-128	1-5	400	12	HP-UX	Ethernet	400/200-300	32	$308,500
	HP 9000 Series 800 Model 850S	November 1987	OA, SE	DEC 8820	NP	1.86-2.4 (S)	21358 DH (actual)	73	32-128	1-5	300	2-12	HP-UX	NP	300/150	32	$138,500 with 32M bytes memory, multiplexer card, HP-IB card, battery backup, 64-user license
	HP 9000 series 800 Model 840S	November 1986	SE	DEC 8530, 8550	NP	0.542-0.738 (S)	8835-9920 DH (actual)	125	8-96	1-5	Up to 128	1-3	HP-UX	Ethernet	128/60	32-48	$86,550 with 8M byte memory, integrated cabinet, power supply, channel I/O bus, 1-6 channel multiplexer with 4 available ports
Honeywell Bull, Inc. (800) 328-8111 ext. 99	DPS 7000 Model 60	July 1988	DP, TP	IBM 4381	NP	NP	34 DC (actual)	120	16-32	1.8	8-24	8-24	GCOS7	Ethernet	2500/600	32	$861,000 with 4 CPUs, 16M bytes memory, 8 ports, console
	DPS 7000 Model 52	February 1989	DP, TP	IBM 4381	NP	NP	23.8 DC	120	16-32	1.8	8-24	8-24	GCOS7	Ethernet	2500/600	32	$445,000 with 4 CPUs, 16M bytes memory, 8 ports, console
	DPS 7000 Model 72	February 1989	DP, TP	IBM 4381	NP	NP	17 DC (actual)	120	8-24	1.8	8-16	8-16	GCOS7	Ethernet	2500/600	32	$354,000 with 2 CPUs, 8M bytes memory, 8 ports, console
	DPS 7000 Model 50	October 1987	DP, TP	IBM 3090, AS/400	NP	NP	15 DC (actual)	120	8-16	1.8	48	6-8	GCOS7	Ethernet	600/200	32	$198,500 with 2 CPUs, 8M bytes memory, 4 ports, console

[1] DP = data processing, SE = software engineering, OA = office automation, TP = transaction processing
[2] S = scalar, P = peak, LP = Linpack, LL = Livermore Loops
[3] DH = Dhrystone, DC = Dhrystone C

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VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
IBM Corp. (800) 426-3468	4381 Model 11	1988	DP, SE, TP	NA	NP	0.39 (P)	0.39 LP (actual)	0.8-68	4-16	3	NP	6-12	VM/XA, VM/SP, MVS/XA, MVS/SP, DX/37	Both	NP	32	$183,750
	4381 Model 21	First quarter 1988	DP, SE, TP	NA	NP	0.47 (P)	0.47 LP (actual)	0.8-68	8-16	3	NP	8-16	VM/XA, VM/SP, MVS/XA, MVS/SP, DX/37	Both	NP	32	$236,250
	4381 Model 22	First quarter 1988	SP, SE, TP	NA	NP	0.79 (P)	0.97 LP (actual)	0.8-68	16-32	6	NP	8-12	VM/XA, VM/SP, MVS/XA, MVS/SP, DX/37	Both	NP	32	$367,500
	4381 Model 23	First quarter 1988	DP, SE, TP	NA	NP	1.31-1.7 (P)**	1.31-1.7 LP (actual)**	0.8-52	16-64	6	NP	8-12	VM/XA, VM/SP, MVS/XA, MVS/SP, DX/37	Both	NP	32	$556,500
	4381 Model 24	First quarter 1988	DP, SE, TP	NA	NP	2.63 (P)**	2.63 LP (actual) **	0.8-52	16-64	3	NP	12-24	VM/XA, VM/SP, MVS/XA, MVS/SP, DX/37	Both	NP	32	$934,500
	4381-91E	September 1988	SP, SE, TP	NA	NP	1.31-1.7 (P)**	1.31-1.7 LP (actual)**	0.8-52	16-64	3	NP	8-12	ESA/370	Both	NP	32	$556,500
	4381-92E	September 1988	SP, SE, TP	NA	NP	2.63 (P)**	2.63 LP (actual) **	0.8-52	16-64	3	NP	16-24	ESA/370	Both	NP	32	$934,500
	9373 Model 20	July 1987	DP, OA, SE, TP	NA	0.5*	NP	0.137 LP (actual)	90	4-16	6	NP	NP	VM/SP, VM/IS, VSE/SP, IX/370	NP	NP/20-50	32	$32,550 with 4M byte memory
	9375 Model 50	October 1987	SP, OA, SE, TP	NA	0.5*	NP	0.16 LP (actual)	90	8-16	3	NP	NP	VM/SP, VM/IS, VSE/SP, IX/370	NP	NP	32	$68,250 with 6M byte memory
	9375 Model 90	July 1987	SP, OA, SE, TP	NA	1.3*	NP	0.40 LP (actual)	90	8-16	3	NP	NP	VM/SP, VM/IS, VSE/SP, IX/370	NP	NP	32	$97,650 with 6M byte memory
	System/36 Model 300	1988	DP	NA	0.47*	NP	NP	NP	4-8	2.5-3	NP	NP	CPF	NP	NP	48	$85,625 with 4M byte memory
	System/36 Model 300	1988	DP	NA	0.63*	NP	NP	NP	6-8	2.5-3	NP	NP	CPF	NP	NP	48	$112,875 with 6M byte memory
	System/36 Model 400	1988	DP	NA	0.82*	NP	NP	NP	6-8	2.5-3	NP	NP	CPF	NP	NP	48	$146,625 with 6M byte memory
	System/36 Model 900	1988	DP	NA	0.89*	NP	NP	NP	8-16	2.5-3	NP	NP	CPF	NP	NP	48	$101,625 with 6M byte memory
	System/38 Model 700	1988	DP	NA	1.2*	NP	NP	67-267	16-32	3	12	NP	CPF	NP	256/NP	48	$385,125 with 16M byte memory, 64M-byte disk
	AS/400 Model B30	August 1988	DP, OA, TP	NA	NP	NP	NP	94	4-36	2.5-3	NP	NP	OS/400	Token Ring	NP	32	$69,500-$113,500 with system unit, tape unit, modem, rack enclosure, 9332 Model 400 DASDs, twinaxial workstation controller, OS/400, supplies kit
	AS/400 Model B40	August 1988	DP, OA, TP	NA	NP	NP	NP	94	8-40	2.5-3	NP	NP	OS/400	Token Ring	NP	32-48	$101,195 with system unit, 2440 tape subsystem, modem, rack enclosure, 9332 Model 400 DASDs, twinaxial workstation controllers, OS/400, supplies kit
	AS/400 Model B50	August 1988	DP, OA, TP	NA	NP	NP	NP	60	16-48	2.5-3	NP	NP	OS/400	Token Ring	NP	32-48	$306,690-$448,690 with system unit, rack enclosures, magnetic storage device controller, workstation controllers, I/O tape subsystem, OS/400, modem
	AS/400 Model B60	August 1988	DP, OA, TP	NA	NP	NP	NP	60	32-96	3	NP	NP	OS/400	Token Ring	NP	32-48	$461,190-$803,190 with system unit, rack enclosures, magnetic storage device controllers, I/O tape subsystem, OS/400, modem
DEC 603-884-1304 Chmsford, England	Series 30 Level 0/SF71	October 1987	DP, TP	IBM 4361-50, DEC VAX 6000	4.5	NP	22 transfac. DC (estimate)	30	16-64	3	NP	3-6	VMS	Ethernet	4000+/-750	32	$672,000 with 16M byte memory
	Series 30 Level 0/SF72	October 1988	DP, TP	IBM 4381-23, DEC VAX 6000	8.5	NP	41 transfac. DC (estimate)	30	32-128	3	NP	6-12	VMS	Ethernet	4000+/-1400	32	$1,194,000 with 32M byte memory
	Series 30 Level 40	October 1987	DP, TP	IBM 4381-91, DEC VAX 6000	2.1	NP	11 transfac. DC (estimate)	30	8-32	3	NP	3	VMS	Ethernet	4000+/-300	32	$378,000 with 8M byte memory
	Series 30 Level 2/SE2P	First quarter 1989	DP, TP	IBM AS/400 Model B60, DEC VAX 6000	5.6	NP	30 transfac. DC (estimate)	170	24-48	3	NP	6	VMS	Ethernet	4000+/-300	32	$1,161,000 with 24M byte memory
	Series 30 Level 2/CE2P	October 1987	DP, TP	IBM AS/400 Model B60, DEC VAX 6000	4.6	NP	14 transfac. DC (estimate)	170	24-64	3	NP	6	VMS	Ethernet	4000+/-400	32	$1,176,000 with 24M byte memory

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VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
HCL 081-852-1301 (Manchester, England)	Series 39 Level 30XP	August 1988	DP, TP	IBM AS/400 Model B30, DEC VAX 6240	2.0	NP	7.4 transac. DC (estimate)	170	16-32	3	NP	3-5	VMS	Ethernet	4000+/ 250	32	$80,000 with 16M byte memory
	Series 39 Level 35XP/2	August 1988	DP, TP	IBM AS/400 Model B50, DEC VAX 6230	4.7	NP	14.5 transac. DC (estimate)	170	20-64	3	NP	10	VMS	Ethernet	4000+/ 500	32	$150,000 with 32M byte memory
	Series 39 Level 15XP	September 1988	DP, TP	IBM AS/400 Model B30, DEC VAX 6220	1.6	NP	4.3 transac. DC (estimate)	170	8-64	2.6	NP	3	VMS	Ethernet	4000+/ 125	32	$35,000 with 8M byte memory
	Series 39 Level 25XP	August 1988	DP, TP	IBM AS/400 Model B40, DEC 6210	1.8	NP	5.0 transac. DC (estimate)	170	16-34	3	NP	3	VMS	Ethernet	4000+/ 170	32	$60,000 with 16M byte memory
MAI Basic Four, Inc. (714) 231-5100	Advanced Series 80	June 1988	DP, OA, TP	IBM AS/400 Model B60	NP	NP	NP	80	4-24	20 MBs	2-4 parallel, 20-256 serial	NP	BOSS/VS	NP	255/65	32	$130,595 with CPU, 128K-byte cache, 4M byte memory, 20 ports, 621M-byte disk, magnetic tape controller
McDonnell Douglas Computer Systems Co. (714) 220-1000	Series 10	1987	OA	DEC VAX 6310, 6320, IBM 9370	NA	NP	NP	250	1-64	10-20	16-1024	NP	Unity	NP	400/200	32	$30,000 with 1M byte memory, 150M-byte disk, 10 ports, cartridge tape, printer port, operating system
	Series 8000	1981	OA	DEC VAX 6300, IBM System/88	NP	NP	NP	150	4-8	10-20	16-200	NP	Unity	NP	200/100	32	$99,950 with 4M byte memory, 300M-byte disk, 16 ports, tape, 2 printer ports, operating system
Modular Computer Systems, Inc. (305) 974-1380	Classic 32/87	1987	DP	NP	2.4	NP	NP	110	256	Up to 5	NP	32-64	MAX 32, MAX IV, Realix	NP	256/NP	32	$148,500 with 64K-byte cache, 2M bytes memory, console, power supplies
NCR Corp. Contact local sales office	9852	NP	DP, TP	IBM System 88, 9370, 4381 series	2	NP	NP	145	16-64	1.5	20-36	NA	VRX/E	NP	NP/NP	32	$116,740 with 2 application processors, 2 disc storage processors, 16M bytes memory, 36 channels, console, operating system
	9852	NP	HP, TP	IBM System/ 88, 9370, 4381 series	3	NP	NP	145	20-80	1.5	37-92	NA	VRX/E	NP	NP/NP	32	$148,810 with 3 application processors, 2 disc storage processors, 20M bytes memory, 37 channels, console, operating system
	9852	NP	DP, TP	IBM System/ 88, 9370, 4381 series	4	NP	NP	145	24-80	1.5	24-80	NP	VRX/E	NP	NP/NP	32	$173,160 with 4 application processors, 3 disc storage processors, 24M bytes memory, 24 channels, console, operating system
	9852	NP	HP, TP	IBM System/ 88, 9370, 4381 series	6	NP	NP	145	28-160	1.5	51-99	NP	VRX/E	NP	NP/NP	32	$264,870 with 6 application processors, 3 disc storage processors, 28M bytes memory, 51 channels, console, operating system
	9854	NP	HP, TP	IBM System 88, 9370, 4381 series	8	NP	NP	145	48-192	1.5	60-128	NP	VRX/E	NP	NA/NP	32	$348,980 with 8 application processors, 4 disc storage processors, 48M bytes memory, 60 channels, console, operating system
	9000 XP	NA	DP, TP	IBM System/ 88, 9370, 4381 series	2.0	NP	NP	30	8-16	1.5	1-8	NA	VRX/E	NP	NA/NA	32	$130,500 with 1 9000 XP processor, 4M bytes memory, dual console, operating system
	V-9000 Series	NA	DP, TP	IBM 3090, 4381 series	1.5-15	NP	NP	30	4-64	1.5	16-256	NP	VRX	NP	NP/NP	32	$995,000-$2,190 million with 1-8 processors, 4-32M bytes memory, 16-32 channels, 1-4 disk controllers
North Data NA (508) 366-4662	ND Family	January 1987	DP, OA, SE, TP	DEC VAX 8000 series	.5-26	NP	NP	70	8-512	1.8	256	1-6	Sintran III	Ethernet	256/60	32	70,000-$600,000
Prime Computer, Inc. (800) 343-8000	9955	May 1988	DP, OA, SE, TP	DEC VAX 8810, 8840	11.5	NP	NP	44	32-128	2.46	8	3	Prime	Both	500/200-280	32	$540,000 with 32M byte memory, 774M-byte disk, system console, operating system
	9955	Third quarter 1988	HP, OA, SE, TP	DEC VAX 8820, 8842	8.5	NP	NP	44	32-64	2.46	8	1	Prime	Both	512/ 150-280	32	$443,400 with 32M byte memory, 774M-byte disk, system console, operating system
	6450	August 1988	DP, OA, SE, TP	DEC VAX 8650	2.9	NP	NP	64	32	2.46	4	2	Prime	Both	384/100-180	32	$309,700 with 32M byte memory, 400M-byte disk, system console, operating system
	6350	February 1988	DP, OA, SE, TP	DEC VAX 8530, 8810, 8820	4.1	NP	NP	77	24-88	2.46	4	2	Prime	Both	256/70-988	32	$181,500 with 24M byte memory, 400M-byte disk, system console, operating system
Pyramid Technology (415) 965-7200	Series 9000	February 1987	DP, TP	DEC VAX 9000	NP	NA	11,000 DH (actual)	104	8-128	2.46	512	12	OSX	Ethernet	1000/300	32	$129,750-$535,200 with 16-32M bytes memory, disk drive, tape drive, 16-32 ports, operating system, 1 channel
Quantel Business Systems, Inc. (408) 991-7777	System 80	November 1987	TP	NA	NP	NP	NP	500	8-16	NP	16	NP	BRINT/ ADE	NP	150+/80	64	$400,000 with CPU, 4M byte memory, 16-bit I/O backplane, 2 cabinets, 4-channel video control controller, 600M-byte disk, disk controller, tape drive, tape controller
Sequent Computer Systems, Inc. (503) 626-5700	Symmetry	December 1987	DP, OA, SE, TP	NA	6-100	46-77 (S)	143,200 DH (actual), 104 DC (actual)	625	8-240	2.46	16-256	8	Dynix/ Unix	NP	1000/ 15-500	32	$80,000 with 2M byte memory, 130M- byte disk, 16 ports, power supplies
Sequoia Systems, Inc. (800) 998-0911	Series 300	August 1987	TP	IBM 3084, DEC VAX Cluster	5-40	NP	35 transac. DC (actual)	30	16-256+	NP	5000	32+	Unix compatible	Ethernet	NP/NP	32	$300,000 with 2 processors, 32M bytes memory, 2 channels, 1 tape drive, 2 500M-byte disk drives, 96 synchronous ports
Star Technologies, Inc. (703) 689-4400	ST 100	July 1985	SE	NA	NP	100 (S), 100 (P)	NP	40	8-64	10	7	NP	NP	NP	16/1	32	$300,000

VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
Stratus Computer, Inc. (800) 458-9160	Stratus XA2000 Continuous Processing System Models 10 and 70	October 1987	TP	IBM System/ 88	NP	NP	16-18 DC (est.)	60.6	8-16	2.400	112	NP	VOS	Ethernet	NP/NP	32	$75,000-$130,000
	Stratus XA2000 Models 110-160	January 1987	TP	IBM System/ 88	NP	NP	14-97 DC (est.)	60.6	8-96	2.400	368	NP	VOS	Ethernet	NP/NP	32	$170,000-$750,000
Tandem Computers, Inc. (408) 725-6000	Nonstop EXT25	August 1986	TP	IBM 4381-22, 4380-82E, 9370-90	4-8	NP	9-18 DC (estimate)	83.3	16-64	1.2	144-986	2-4	Guardian 90	NP	912/160	32	$250,000 with 2 processors, 16M bytes memory, 512M-byte disk, tape drive, communications controller, maintenance console, power supplies, cabinet
	Nonstop TXP	October 1983	TP	IBM 4381-21, 3090-200S	4-32	NP	9-72 DC (estimate)	83.3	16-256	1.2-1.8	NP	2-10	Guardian 90	NP	NP/NP	32	$299,000 with 2 TXP processors, 16M byte memory, 512M-byte disk, tape drive, maintenance console, power supplies
	Nonstop VLX30X	April 1986	TP	IBM 4381-91E, 3090-300S	6-48	NP	14-38 DC (actual)	83.3	32-256	1.2-1.8	NP	2-10	Guardian 90	NP	NP/NP	32	$585,000 with 2 VLX processors, 16M bytes memory, 1.8G-byte disk, 1 system terminal, tape drive, power supplies
The Ultimate Corp. (914) 997-4822	7000 Series	June 1986	TP	NA	NP	NP	NP	300	2-8	1.2	256	2-4	Ultimate operating system	NP	256/64-128	16	$210,000 with CPU, operating system, DBMS, 4MB bytes memory, 515M-byte disk, 32 ports, tape drive
	8000 Series	November 1987	TP	NA	NP	NP	NP	300	2-8	1.2	256	1-4	Ultimate operating system	NP	256/64-128	16	$81,600 with CPU, operating system, DBMS, 2M bytes memory, 300M-byte disk, tape drive
Unisys Corp. (215) 542-6011	U7000/40	March 1986	DP, SE	DEC VAX 6230	NP	NP	NP	100	4-32M	2.4	NP	NP	Unix System V, Release 2 or BSD 4.2	NP	240/120	32	$103,840 with processor, cabinet, power supply
	U7000/50	December 1987	DP, SE	DEC VAX 6230	NP	NP	NP	100	4-32	2.4	NP	NP	Unix System V, Release 2	NP	384/50	32	$113,000 for processor, cabinet & power supply
	U7000/51	December 1987	DP, SE	DEC VAX 6230	NP	NP	NP	100	4-32	2.4	NP	NP	Unix System V, Release 2	NP	384/120	32	$125,000 for processor, cabinet, & power supplies
	U7000/52	December 1987	DP, SE	DEC VAX 6230	NP	NP	NP	100	4-32	2.4	NP	NP	Unix System V, Release 2	NP	384/240	32	$210,000 for 2 processors, cabinet and power supplies
	A4	September 1987	DP, TP	IBM 9370-60, AS/400 Model B40	NP	NP	NP	NP	12-48	3.4	NP	1-24	MCP/AS	NP	NP/NP	48	$55,000 with processor, 12M bytes memory, console, power supplies
	A6 Model F	December 1987	DP, TP	IBM 9370-60, AS/400 Model B50	NP	NP	NP	NP	12-48	4.5	NP	1-24	MCP/AS	NP	NP/NP	48	$145,000 for processor, 12M bytes memory, console, power supplies
	A6 Model K	May 1988	DP, TP	IBM 9370-90, AS/400 Model B60	NP	NP	NP	NP	24-96	4.2	NP	1-32	MCP/AS	NP	NP/NP	48	$230,000 for 2 processors , 24M bytes memory, console, power supplies
	A 10 Model DX	September 1986	DP, TP	IBM 9370-90, 4381-21	NP	NP	NP	72.5	12-24M	3	NP	15-40	MCP/AS	NP	NP/NP	48	$328,000 with processor,12M bytes memory, console
	A 10 Model FX	September 1986	DP, TP	IBM 4381-13, 4381-22	NP	NP	NP	72.5	12-48M	3	NP	15-40	MCP/AS	NP	NP/NP	48	$464,000 with processor, 12M bytes memory, console
	A 10 Model HX	September 1986	DP, TP	IBM 4381-14, 4381-91E	NP	NP	NP	72.5	24-96M	3	NP	25-80	MCP/AS	NP	NP/NP	48	$770,000 with 2 CPUs, 24M bytes memory, console, power supplies
	V 310 Model 2	June 1986	DP, TP	IBM 9370-60, AS/400 Model B30	NP	NP	NP	110	10-20	3	NP	16-32	MCP/VS	NP	NP/NP	40	$126,000 with processor, 10M bytes memory, console, power supplies
	V 340	November 1986	DP, TP	IBM 4381-21, AS/400 Model B40	NP	NP	NP	110	10-40M	3	NP	24-32	MCP/VS	NP	NP/NP	40	$305,000 with processor, 10M bytes memory, console, power supplies
	V 986	October 1986	DP, TP	IBM 9370-90, IBM AS/400, 50	NP	NP	NP	110	16-40M	3	NP	24-64	MCP/VS	NP	NP/NP	40	$305,000 with processor, 10M bytes memory, console, power supplies
	V510	February 1988	DP, TP	IBM 3090 Model 120E	NP	NP	NP	46	20-80M	3	NP	16-64	MCP/VS	NP	NP/NP	40	$666,000 with 20M bytes memory, console, power supplies
	V 520	November 1987	DP, TP	IBM 3090 Model 180E	NP	NP	NP	46	40-180	3	NP	32-64	MCP/VS	NP	NP/NP	40	$1,775,000 with 40M bytes memory, console, power supply
	System 80 Model 10	July 1987	DP, TP	IBM AS/400 Model B30, 9370-60	NP	NP	NP	100	2-8	2.2	NP	1-6	OS/3	NP	NP/NP	32	$94,000 with 2M bytes memory, console, power supply
	System 80 Model 15	October 1988	DP, TP	IBM AS/400 Model B40, 9370-60	NP	NP	NP	100	4-12	2.2	NP	1-6	OS/3	NP	NP/NP	32	$130,000 with processor, 4M bytes memory, console, power supplies
	System 80 Model 30	July 1987	DP, TP	IBM AS/400 Model B60, 9370-90	NP	NP	NP	100	4-16M	2.2	NP	1-6	OS/3	NP	NP/NP	36	$178,000 with processor,4M bytes memory, console, power supplies
	2200-301	December 1986	DP, TP	IBM AS/400 Model B30, 9370-60	NP	NP	NP	100	8-48	3	NP	1-36	OS/1100	NP	NP/NP	36	$110,000 with processor, 4M bytes memory, console, power supplies, 2 176M-byte disks
	2200-302	December 1988	DP, TP	IBM AS/400 Model B30, 9370-60	NP	NP	NP	100	8-48	3	NP	1-36	OS/1100	NP	NP/NP	36	$175,000 with 2 processors, 8M bytes memory, 3 176M-byte disks, console, power supply
	2200-302	October 1987	DP, TP	IBM AS/400 Model B60, 4381-22	NP	NP	NP	100	8-48	3	NP	1-36	OS/1100	NP	NP/NP	36	$262,000 with 2 processors, 8M bytes memory, 2 176M-byte disks, console, power supplies
	2200-304	October 1987	DP, TP	IBM 4381-93, Model 91E	NP	NP	NP	100	8-48	3	NP	1-36	OS/1100	NP	NP/NP	36	$320,000 with 4 processors, 8M bytes memory, 2 176M-byte disks, console, power supplies

VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
Unisys Corp. (215) 542-4011	2200/400	Fourth quarter 1988	DP, TP	IBM 4381-92 III, Model 91E	NP	NP	NP	60	16-64	4.5	NP	8-64	OS/1100	NP	NP/NP	36	$277,000 with processor, 16MB bytes memory, console, power supplies
	2200/600	Fourth quarter 1988	DP, TP	IBM 3090 Model 150E	NP	NP	NP	60	16-64	4.5	NP	8-64	OS/1100	NP	NP/NP	36	$417,306 with 2 processors, 16MB bytes memory, 2 I/O processors, console, power supplies
	2200/800	Fourth quarter 1988	DP, TP	IBM 3090 Model 180E	NP	NP	NP	60	16-64	4.5	NP	8-64	OS/1100	NP	NP/NP	36	$475,156 with 3 processors, 16MB bytes memory, 3 I/O processors, console, power supplies
	2200/900	Second quarter 1989	DP, TP	IBM 3090 Model 180E	NP	NP	NP	55	16-64	4.5	NP	8-64	OS/1100	NP	NP/NP	36	$533,250 with 4 processors, 16MB bytes memory, 4 I/O processors, console, power supplies
	2200/1000	Third quarter 1989	DP, TP	IBM 3090 Model 180E	NP	NP	NP	50	32-64	4.5	NP	8-64	OS/1100	NP	NP/NP	36	$591,750 with 5 processors, 16MB bytes memory, 5 I/O processors, console, power supplies
	2200/1100	Fourth quarter 1989	DP, TP	IBM 3090 Model 180E	NP	NP	NP	50	32-64	4.5	NP	8-64	OS/1100	NP	NP/NP	36	$650,325 with 6 processors, 16MB bytes memory, 6 I/O processors, console, power supplies
Wang Laboratories, Inc. (508) 459-5000	VS 7000 Series	November 1988	DP, OA	IBM 9370, AS/400, VAX 8600, 8800	NP	NP	NP	150	4-32	2.4-3.0	255	NP	VS OS, VS IN/IX	Ethernet	192/ 30-192	32	$75,000-300,000

Course tally

FROM PAGE 68

but will run System/36 programs only after recompiling.

The AS/400 is significant as an entry-level system for unsophisticated users and as a migration path for System/36 and 38 users running out of power.

System/38 users, due for a boost, gained twice their current power and three times their maximum memory immediately, with promises of more to come. Not surprisingly, early customer surveys showed that the majority of initial orders for the AS/400 were coming from System/38 users in need of more power.

Toothless killer

But while the AS/400 made its triumphal entrance, the 9370 floundered in an identity crisis.

Although some said the processor, if introduced by anyone other than IBM, would have been considered a resounding success, others blamed IBM's marketing hype that led many to term the processor the "VAX killer." As a VAX killer, the 9370 proved toothless, however, and IBM was required to make steep price cuts as part of a mid-life kicker delivered last week.

As part of that announcement, IBM added Models 30, 50 and 80 to the line and affixed the label ES (Enterprise System) to the 9370 number. The move was an effort to link the 9370 to its larger cousin, the 3090, which was labeled ES/3090 during the summer.

The labeling change stresses the 9370's 370 architecture and the wide use of that architecture in the largest corporations.

"Our mistake was in positioning," IBM Vice-President Stephen Schwartz says. "We let others position it for us," he adds, claiming that consultants pinned overly optimistic expectations on the 9370.

But having said during the summer of 1987 that it would sell at least 5,000 9370 units by the end of the year, IBM was left with the task of explaining why it fell short of that goal. Most analysts put actual 1987 shipments at about 3,500 units.

Most observers attribute the processors' problems to application and operating system software. Although IBM boasted of some 1,000 applications that were available for the system, many were MVS applications. And IBM admits that although MVS can run on the most powerful 9370, there was virtually no customer demand for MVS on the 9370.

Thus, users were left to run with VM or DOS/VSE, an operating system that IBM has been trying to de-emphasize but one that some users found works the best of all IBM operating systems on the 9370.

However, the 9370 found some success as a host system in small businesses, a change from its original role as departmental processor in Fortune 500 companies. In addition, value-added resellers resold the 9370 with different operating systems. For example, Ultimate Corp. resold the processor with its own version of the Pick system.

Last week, IBM sought to inject new life into the 9370's applications portfolio, announcing double the number of applications.

Analysts such as Annex's Djurdjevic are still enthusiastic about the system, claiming that its embodiment of the 370 architecture in an affordable package will make it a long-term success.

The 9370 could also pick up new users from those who had been stranded with the 8100. IBM offered a migration path to those users by announcing a conversion aid to the 9370 and a revised version of the company's DPPX operating system, DPPX/370. The migration path could help stanch IBM's loss of 8100 users who have moved to other vendors' systems following IBM's announcement that the 8100 was "functionally stabilized."

Back in the limelight

Having been a spectator to the IBM-DEC battle for the past few years, Hewlett-Packard Co. now appears ready to reassert itself. HP has started to win converts to its reduced instruction set computing-based Precision Architecture series. Last spring, the company introduced six models, including the highest performing systems in HP's history.

The Precision Architecture — also called Spectrum — models included four low-end systems and two medium-scale systems, the HP 3000 Series 935 and 955. The 955 is not scheduled for availability until the first half of 1989. All 3000 series models run HP's MPE operating system. HP also introduced three HP 9000 series models, which run the HP-UX operating system, HP's version of Unix.

Like HP, Unisys sought resurgence but not in a new architecture. Instead, the company re-emphasized its former Sperry Corp. systems, which had languished in the period immediately following the Burroughs-Sperry merger.

WITH IBM and DEC solidifying holds on their markets, smaller vendors may face difficulty in expanding their sales territories.

Unisys announced six 1100/2200 series models, called the 2200/400 series, ranging from an entry-level uniprocessor, rated at 2.4 MIPS, to a configuration of six tightly coupled processors said to operate at about 14 MIPS. Aimed primarily at departmental and distributed processing environments, those processors are successors to Unisys' 2200/200 family.

"We said we'd maintain the two mainframe architectures, and we are accelerating the upgrading of the Sperry side to a state-of-the-art system," Unisys' Blumenthal says.

Adding its weight to the momentum of proprietary systems, NCR revamped its I series of departmental systems to include four new models capable of 1.3 to 5 MIPS. The processors run Release 6.0 of NCR's ITX operating system, which permits clustering.

Honeywell Bull added to its DPS 8000 series of small mainframes in May, introducing the three-processor Model 83 and the four-processor Model 84. Both are extensions of the single-processor Model 81 and the dual-processor Model 82, which first shipped in third-quarter 1987. The DPS 8000 series was designed to run Honeywell's GCOS 8 operating system. Models 83 and 84, which perform symmetrical multiprocessing, are intended to compete with high-end IBM 4381s and low-end 3090s.

Wang Laboratories, Inc. introduced the VS 7320, a dual processor, and a virtual machine model of its operating system that would allow multiple versions of Unix and VS to run concurrently.

In January, Prime Computer, Inc. introduced the 4150 and 4050 departmental systems, capable of 4.1 and 2.8 MIPS, respectively.

In February, Encore Computer Corp. introduced the Multimax 310, a slimmer version of its parallel processing Multimax 320, designed to be more attractive to low-end users.

Sequent Computer Systems, Inc.'s Symmetry series was shipped in late spring with a cache feature that had previously been delayed, allowing up to 30 CPUs in a single system.

Stratus Computer, Inc. announced two entry-level OLTP systems, the XA2000 Models 50 and 70, in December 1987.

With IBM and DEC solidifying holds on their markets, smaller vendors may face difficulty in expanding their sales territories. Their best hope is perhaps an open Unix, to which IBM and DEC, ironically, are contributing no small amount of energy. •

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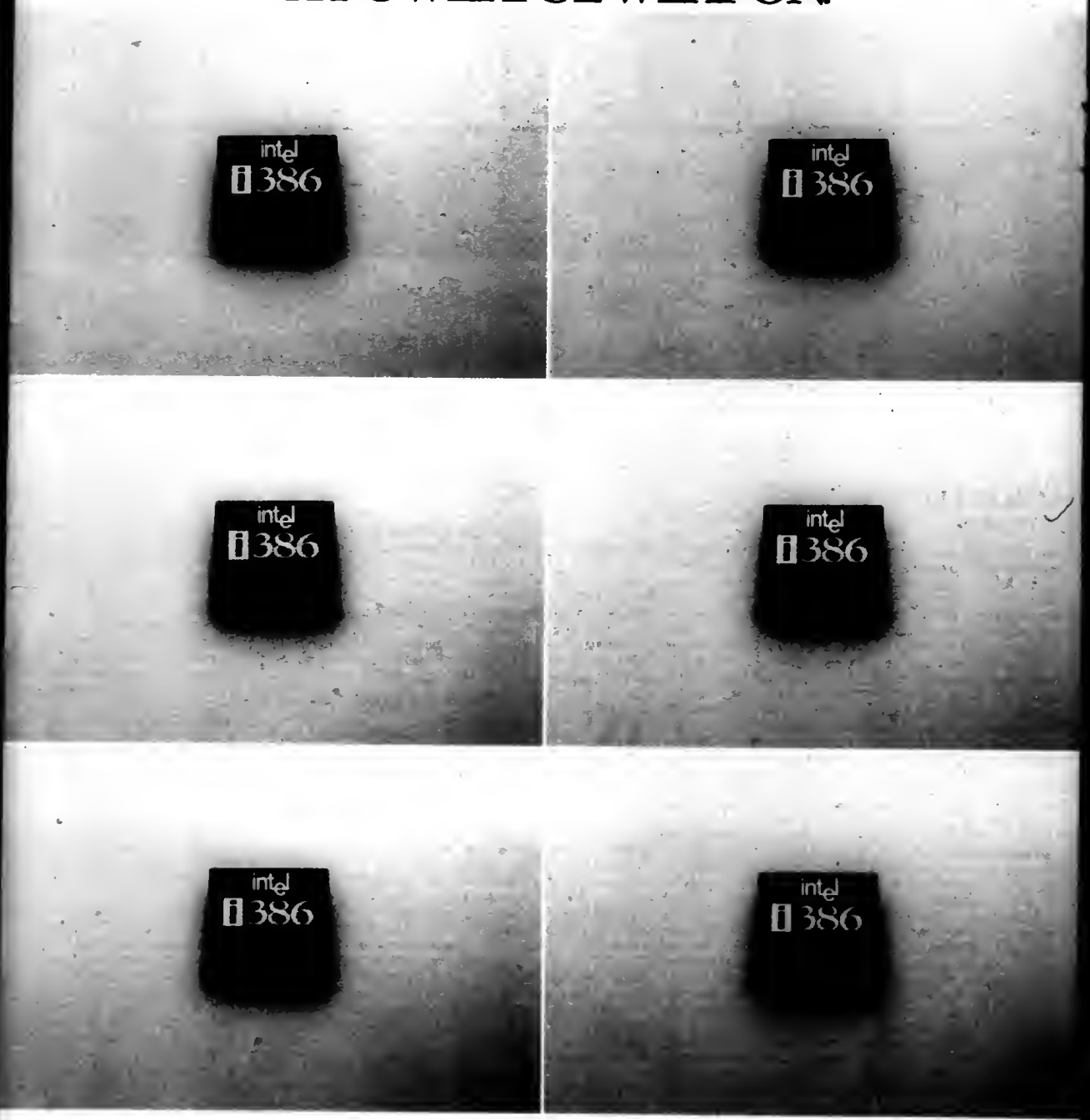

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Too many minisupers and not enough buyers

In the crowded market, vendors tried differentiation, bargain prices, but they still couldn't get users to bite

The summer of 1988 will be remembered among Midwestern farmers for the devastating drought. In computing history, the season will go down as the time the minisupercomputer market dried up.

By late summer, minisuper vendors had begun to resemble stunted cornstalks on the prairie: Celerity Computing, faced with bankruptcy, sold its assets to Floating Point Systems, Inc, itself deep in red ink; Alliant Computer Systems Corp. reported its first-ever quarterly loss; Saxpy Computer Corp., facing bankruptcy, sought a buyer; Multiflow Computer, Inc. laid off workers; and Prime Computer, Inc. wrote off millions in sundering its agreement with minisuper maker Cydrome, Inc.

"The market is a price/performance hole. It's big enough to support only one or two companies," says Richard Shaffer, publisher of the "Technologic Computer Letter." "As long as there are more than two companies, pricing will suffer."

Although the stiff price competition may have provided some bargains for organizations that were already interested in the technology, it failed to bring enough new users into the market to support the number of vendors vying for survival. And with the base of vendors almost certain to shrink, users' choices are also likely to diminish.

Solo survivor?

Shaffer says that among the beleaguered minisuper vendors, Convex Computer Corp. has the best chance of survival. "Convex has name recognition. They were first. They have software, and no one has been able to touch them," he says.

In March, Convex announced six models in its C series, moving from vector processing to parallel.

The most powerful models, the three-processor C230 and the four-processor C240, are slated to be shipped in the fourth quarter.

Archrival Alliant, despite difficulties, posted a full slate of announcements in the past year. In October 1987, the company claimed to break the $100,000 price barrier with the introduction of a low-end model, the FX/4.

In February, Alliant introduced its second-generation systems, the FX/40 and FX/80, and announced it would acquire Raster Technologies, Inc.

In May, Alliant announced the FX/82, a cluster of two FX/80s, and in August, the company brought out its Visualization series, which are models equivalent to its existing line but with tightly integrated Raster Technologies graphics processors added.

Other minisuper vendors tried to weather the drought. Cydrome announced the Cydra 5 in January, which it called a departmental supercomputer. Prime renamed the machine the MXCL 5 and sold it under its label before becoming discouraged with slow sales and dropping the product from its line.

On the heels of its Celerity acquisition, Floating Point introduced the M64/145, a high-end addition to its M64 series. In May, Floating Point announced its M64/35 MCAE Superserver.

When the dust bowl days in minisuper territory have passed, the survivors may find they have endured only to see their harvest gathered by industry giants IBM and Digital Equipment Corp.

Both stand poised to reap whatever fruit the field offers, having watched others perform the labors of cultivation.

IBM continued to offer its 3090 vector facility, enhancing it at the introduction of the 3090 5 models in July.

IBM seeks to promote the vector facility as an attractive add-on to its 3090 mainframes. Users who own the mainframes are encouraged to consider adding the vector option.

In this way, IBM can build its own market on its installed mainframe base without incurring the steep sales expenses stifling the multitude of smaller vendors.

Shaffer, however, is critical of IBM's approach. "IBM does not have the right product. They have a PR campaign," he maintains. "Customers want high-speed computers on a network, not an add-on facility."

Many observers have been waiting for DEC to seriously enter the market. However, it made its first foray in a low-key manner: When introducing its multiprocessing 8800 "Polar Star" series, DEC said the processors could also be used in parallel but a programmer would have to "decompose" manually.

With the introduction of VMS Version 5.0 several weeks later, however, DEC unveiled a VAX Fortran compiler, bringing full parallel processing capability to its VAX line.

Computer shoppers may have noticed that terminology took a strange — and misleading — twist this year. Many mini-

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supercomputer vendors began dropping the "mini" prefix in describing their products, instead calling their machines supercomputers, formerly a name used to describe only the world's most powerful and costly processors.

The intent may have been to achieve product differentiation in an overcrowded market. Or it may be that minisupercomputer vendors thought that by changing categories, they could erase the stigma of failure and, by association, pick up some of the luster of supercomputing leader Cray Research, Inc.

Whatever the reasoning, this shift amounts to false labeling. While superminis may have achieved computing levels that were the exclusive preserve of true supercomputers a few years ago, supercomputers have gained performance as well, keeping distance between them and their lower priced followers.

CALLING TODAY'S minisupercomputers "supercomputers" makes about as much sense as calling a personal computer a mainframe, simply because today's PC has as much power as a mainframe of yesteryear.

Calling today's minisupercomputers "supercomputers" makes about as much sense as calling a personal computer a mainframe, simply because today's PC has as much power as a mainframe of yesteryear.

While the minisuper vendors sorted themselves out, the Minnesota twins of supercomputing, Cray and ETA Systems, Inc. each introduced new systems that increased the angle of their tilt toward Unix.

The move toward Unix is likely to bring an increasing number of applications to supercomputing users as developers find it attractive to write for an operating system that can be used on a variety of hardware. Unix should also free users from dependence on a single vendor, opening up the market to competitive bidding as never before.

In February, Cray introduced the eight-processor Y-MP/832 as an extension of its six-year-old X-MP family. At $20 million, the Y-MP carries the top price tag of any Cray system.

Unicos, Cray's adaptation of Unix, is standard on the Y-MP, as it is for the Cray-2, while COS, Cray's other operating system, is available as an option. The Y-MP features 32-bit addressing and circuits that are 1,000 times denser than those in the 24-bit X-MP, according to Cray.

In May, Cray replaced its best-selling X-MP product line with an extended architecture version. With a top price of $14 million, the X-MP EA line is intended to offer more power to X-MP customers who could not afford to move to the Y-MP.

The Cray X-MP EA offers up to four times the memory of the X-MP system and implements the Y-MP's 32-bit architecture.

The systems contain one to four CPUs. The X-MP EA comes with both Unicos and COS operating systems.

Sibling rivalry

In October 1987, Cray's Twin Cities rival, ETA, announced two low-end versions of its ETA 10 supercomputer. The ETA 10 Models P and Q, priced at $850,000 and $1.2 million, respectively, use air for cooling rather than the liquid nitrogen used by the original ETA 10 model.

The Models P and Q are intended to fill what ETA termed a gap between supercomputers and minisupers. "The P and Q models give us an installed base. Later, users can move up to more powerful ETAs," an ETA spokesman says.

At the time of introduction, some analysts were skeptical that the systems might fall through a crack in the market rather than find a niche. However, by early September, ETA reported that 16 P and Q models had shipped.

Although Unix was not available on the systems at the time of rollout, ETA says it is currently in beta testing and will be formally announced in early October. "The users are demanding Unix. We are going to give the user what he wants," the ETA spokesman says.

Later this year, the low-end supercomputer market will greet yet another player as Evans and Sutherland Computer Corp., widely known in the graphics market, is scheduled to announce its entry.

In the massively parallel arena, BBN Advanced Computers, Inc. introduced in October 1987 the Butterfly GP1000, a Unix-based multiprocessor that can contain up to 256 microprocessors sharing one gigabyte of memory.

In May, Active Memory Technology, Inc. introduced the DAP 510, a low-priced massively parallel system for number-crunching applications that uses a VAX or a Sun Microsystems, Inc. workstation as a front end.

A year from now, while there will undoubtedly be fewer minisupercomputer vendors from which to choose, the promise of Unix portability will, at least, allow users to choose freely among those vendors that remain.

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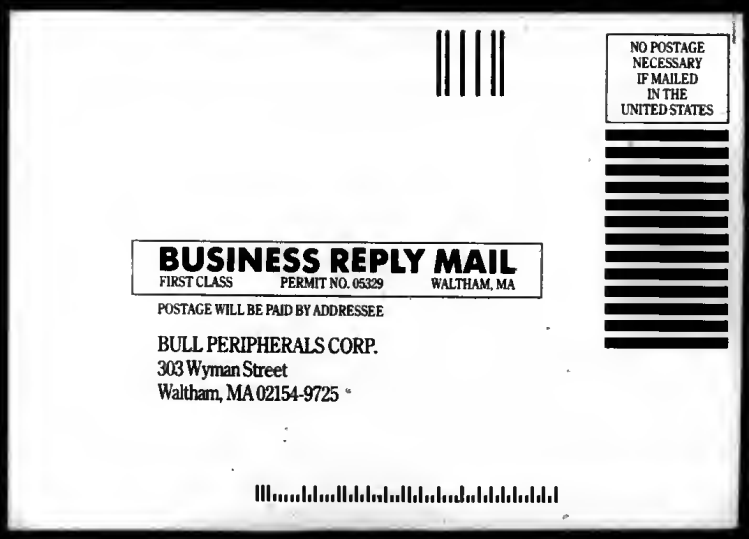

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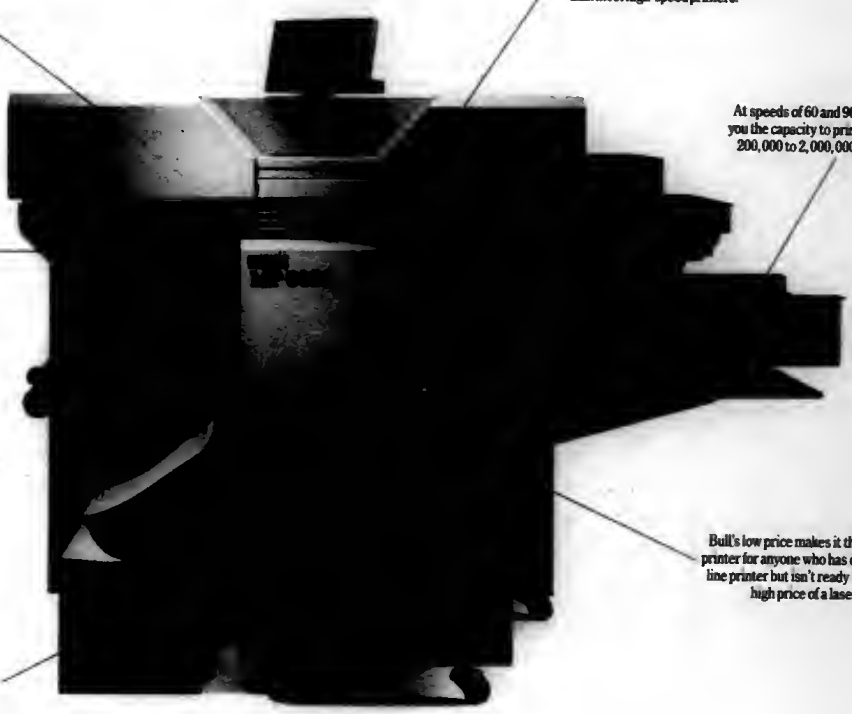

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Special-purpose systems

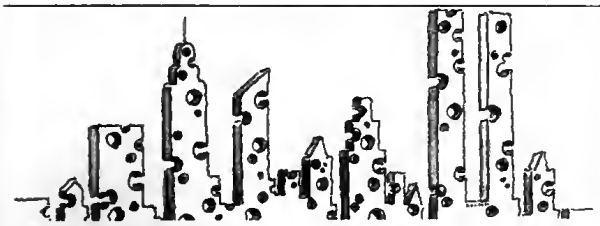
VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
Ardent Corp. (408) 748-0200	1440E Vector Processor	2000	SE	IBM 3090 Model 600E	NP	10-1,200 (S); 1,714 (P)	20 LP (actual); 17.11 LL (actual)	7	64-1,024	3	4,096	32	MVS/XA	Ethernet	NP/NP	64	$6.5 million with 64M bytes memory, 16 channels, all power supplies
	1240E Vector Processor	1994	SE	IBM 3090 Model 400E	NP	10-600 (S); 857 (P)	20 LP (actual); 16.74 LL (actual)	7	64-1,024	3	4,096	32	MVS/XA	Ethernet	NP/NP	64	$5 million with 64M bytes memory, 16 channels, all power supplies
	1140E Vector Processor	1994	SE	IBM 3090 Model 600E	NP	10-300 (S); 429 (P)	20 LP (actual); 14.86 LL (actual)	7	32-512	3	4,096	32	MVS/XA	Ethernet	NP/NP	64	$4 million with 32M bytes memory, 16 channels, all power supplies
	3000 Vector Processor	1995	SE	IBM 3090 Model 3000	NP	10-520 (S); 286 (P)	20 LP (actual); 13.89 LL (actual)	7	32-512	3	4,096	32	MVS/XA	Ethernet	NP/NP	64	$3.5 million with 32M bytes memory, 16 channels, all power supplies
Alliant Computer Systems Corp. (508) 486-4900	FX/1	May 1985	SE	DEC VAX 8800, IBM 3090	NP	4.4 (S), 11.8 (P)	1.3-1.4 LP (actual)	170	64	NP	NP	Two	Unix	Ethernet	8/NP	64	$50,000
	FX/4	November 1987	SE	DEC VAX 8800, IBM 3090	NP	20.7 (S), 47.2 (P)	4.9-6.6 LP (actual)	170	128	NP	NP	Six	Unix	Ethernet	16/NP	64	$90,000
	FX/40	March 1988	SE	DEC VAX 8800, IBM 3090	NP	32.6 (S), 94.4 (P)	5.3-6.8 LP (actual)	170	128	NP	NP	Six	Unix	Ethernet	32/NP	64	$140,000
	FX/80	March 1988	SE	DEC VAX 8800, IBM 3090	NP	70 (S), 188.8 (P)	8.5-10.8 LP (actual)	170	256	NP	NP	12	Unix	Ethernet	64/NP	64	$290,000
	FX/82	July 1988	SE	DEC VAX 8800, IBM 3090	NP	377.6 (P)	NP	170	512	NP	NP	24	UNIX	Ethernet	128/NP	64	$1,250,000
IBM Advanced Computers, Inc. (617) 273-6000	Butterfly GP1000	October 1981	SE	NA	200	100 MFLOPS (S), 200 MFLOPS (P)	200,000 DH (actual)	8	8-512	2.0	128	NP	Based on Unix	Ethernet	NP/NP	32	$80,000 with 4M bytes memory, 1 terminal, 128M-byte tape drive
Britton Lee, Inc. (408) 378-7000	BL8000 Series Shared Database Systems	1988	DP, OA, SE	NA	NP	NP	NP	NP	16-256	3	54	Six	Relational database operating system	Ethernet	NP/150+	32	$345,000-$498,000 with 64M bytes memory, 4G-byte disk, tape
	BL700 Series Shared Database Systems	1981	DP OA, TP	NA	NP	NP	NP	NP	4-8	3	—	One- Seven	Relational database operating system	Ethernet	NP/100+	18	$185,000-$280,000 with 8M bytes memory, 2G-byte disk, tape drive
	BL300 Series Shared Database Systems	1985	DP, OA, TP	NA	NP	NP	NP	NP	4	1.0	Three	One-four	Relational database operating system	Ethernet	NP/30+	18	$45,000-$136,000 with 4M bytes memory, 830M- byte disk, tape drive
Convergent Computer Corp. (800) 631-6154	3000	1985	DP, SE, TP	DEC Micro-n II	NP	NP	.079 LP (actual)	400	3-4	1.5	One	NP	OS/32, Xelos	Ethernet	16/8	32	$27,500 with 2M bytes memory, 180M-byte disk, 2 communication lines, cartridge tape
	3800	1984	DP, SE, TP	DEC Micro-n II	NP	NP	.079 LP (actual)	400	3-4	1.5	One	NP	OS/32, Xelos	Ethernet	24/16	32	$30,500 with 2M bytes memory, 8 communication lines, VDU console
	3212	3000	DP, SE, TP	DEC VAX 3500	NP	NP	.16 LP (actual)	160	4-16	3	Eight	NP	OS/32, Xelos	Ethernet	64/32	32	$42,000 with 4M bytes memory, 8 communication lines, VDU console
	3200 XP	2000	DP, SE, TP	DEC VAX 3500	1	NP	.38 LP (actual)	160	4-16	3	16	NP	OS/32, Xelos	Ethernet	128/64	32	$65,300 with 4M bytes memory
	3200 MPS	1985	DP, SE, TP	DEC VAX 3500	1.9-6.3	NP	.38-1.80 LP (actual)	160	8-16	3	16	NP	OS/32	Ethernet	128/64	32	$60,000 with 2M bytes memory, CPU with one attached processor, 8 communication lines
	3200 MPS	2000	DP, SE, TP	DEC VAX 8600, 3500 units	6.4-63.0	NP	1.3-7.3 LP (actual)	160	8-128	3	32	NP	OS/32	Ethernet	512/160	32	$265,000 with 4M bytes memory, WCS, Floating Point Systems, Inc. processor, 8 communication lines, VDU console
Convex Computer Corp. (214) 952-0300	C120	1984	SE	IBM 3090 VF	11.5	20 (S), 20 (P)	3.6 LP (actual)	100	16-1024	10	Up to 32	Five	Unix	Ethernet/ 125	60	64	$275,000 with 32M bytes memory, system console with printer, service processor, multi-bus I/O processor
	C201-C202 Supercomputers	1988	SE	IBM 3090 VF	16.6 (per processor)	36-72 (S), 36-72 (P)	7.3-12.4 MFLOPS LP (actual)	55	32-2048	10	Up to 64	Four	Unix	NP	256/ 128	64	$495,000-745,000 with 32M bytes memory, system console with printer, service processor, multi-bus I/O processor
	C210-C240 Supercomputers	1987	SE	IBM 3090-200E VF	31.6 (per processor)	50-200 (S), 50-300 (P)	10-18M FLOPS LP (actual)	40	32-2048	10	Up to 128	Four-eight	Unix	Ethernet	256/ 128	64	$635,000-$1.3 million with 32M bytes memory, system console with printer, service processor, multibus I/O processor

* Based on *Computerworld* estimates.
** Using Argonne National Laboratory vector unrolling technique and Add/Multiply Assist Microcode.
***One DEC MIPS equals the performance of the VAX 11/780.
[1]Commercial data processing (DP); scientific/engineering (SE); office automation (OA); on-line transaction processing (TP).
[2]Full-precision millions of floating-point operations per second (MFLOPS). Sustained (S); peak (P).
[3]Per-second performance ratings, based on the following industry-standard benchmarks: Dhrystone, Version 1.1, peephole optimization only (DH); Debit/Credit (ET1) transactions based on 95% subsecond responses (DC); Linpack 100 x 100 full-precision in MFLOPS (LP); Livermore Loops harmonic mean, 14 loops (LL). Vendors supplied either actual or estimated benchmark figures.

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
Cray Research, Inc. (612) 333-5889	Cray Y-MP	Third quarter 1988	SE	HA	NP	300 (S), 1000 (P)	200 LP (actual), 274.4 LL (actual)	6	256	9.6	NP	61 devices can be attached	Unicos	Both	NP/NP	64	$20 million
	Cray-2 (4 processors)	March 1985	SE	HA	NP	30 (S), 1000 (P)	72 LP (estimated), 101 LL (estimate)	4.1	2000	9.6	NP	40 devices can be attached	Unicos	Both	NP/NP	64	$15.5 million
	Cray-2 (3 processors)	Also option	SE	HA	NP	40 (S), 175 (P)	72 LP (actual), 101.8 LL (actual)	4.1	512	9.6	NP	32 devices can be attached	Unicos	Both	NP/NP	64	$12 million
	Cray X-MP EA/14SE	NP	SE	IBM 3090	NP	34 (S), 210 (P)	46 LP (actual), 14.3 LL (actual)	10	39	9.6	NP	16 devices can be attached	Unicos	Both	NP/NP	64	$2.5 million
	Cray X-MP EA/464	February 1988	SE	HA	NP	160 (S), 937 (P)	120 LP (estimated), 74.3 LL (estimated)	9.5	256-512	9.6	NP	64 devices can be attached	Unicos	Both	NP/NP	64	$14 million
CSP, Inc. (617) 273-6030	Mini-Map XL38, HXL38 Array Processor	1984	SE	Dedicated peripheral for DEC VAX, Microvax, PDP and HP 3000 series 250	2.7	38-380 (P)	0.5 LP (estimate)	125-375	5-16	NP	Three	NP	DEC VMS, RSX, Hewlett-Packard HPUX	NP	1/NP	32	$27,500 with 5M bytes memory, coprocessor
	MAP-4000 Application Accelerator	September 1988	SE	Dedicated peripheral for DEC Microvax, Microvax II	10	20-40 (P)	4 LP (estimate)	100	2-40	NP	Five	NP	VMS	NP	1/NP	32, 64	$18,985 with 2M bytes memory
Cydrome, Inc. (408) 986-0200	Cydra 5	November 1987	SE	IBM 3090	NP	25-50 (S), 25-50 (P)	16.4 LP, 5.3 LL (actual)	40	512	2.5	128	NP	Cydrix	Ethernet	128/30-50	32 or 64	$485,000
Elxsi Corp. (408) 942-0900	6420	1983	SE	DEC VAX 8800	7	4 (S), 16 (P)	1.5 LP (actual)	50	16-32	2.4	1984	Two-eight	Embos (proprietary), Unix System V, BSD 4.2, EMS	Ethernet	1024/200+	64	$395,000 with 1 CPU, 16M bytes memory, 2 CRTs, 474M-byte disk, tape drive, 32 ports (RS232)
	6460	Fourth quarter 1988	SE	DEC VAX 8800	28	40 (S), 80 (P)	10 LP (estimate)	22	16-32	2.4	1024	Two-eight	Embos (proprietary), Unix System V, BSD 4.2, EMS	Ethernet	1024/200+	64	$695,000 with 1 CPU, 32M bytes memory, 2 CRTs, 891M-byte disk, tape drive, 32 ports (RS232)
ETA Systems, Inc. (612) 550-6400	ETA10-E	December 1988	SE	HA	NP	6000 (P)	10 MFLOPS LP (actual)	10.5	256-1280	12	NP	NP	EOS, ETA System V	Ethernet	NP/NP	32 or 64	$5.9 million-$10.7 million
	ETA10-P	December 1987	SE	HA	NP	750 MFLOPS (P)	30 MFLOPS LP (actual)	24	96-896	12	NP	NP	EOS, ETA System V	Ethernet	NP/NP	32 or 64	$900,000-$1.9 million
	ETA10-G	NP	SE	HA	NP	10000 (P)	40 LP (estimated)	7	896-8384	12	NP	NP	EOS, ETA System V	Ethernet	NP/NP	32 or 64	$8.7 million-$22.5 million
Floating Point Systems, Inc. (503) 641-3151	FPS M64 and Series 60	1984	SE	IBM 3090-180	190	33 on 1,000 by 1,000 LP benchmark (S), 38 (P)	5.9 LP (actual), 0.03 LL (actual)	53	8-112	22	24	Six	Supports VMS	Ethernet	31/5-6	64	$370,000
Gould Computer Systems Division (800) 4-GOULD	Night Hawk series Model 3000	NP	SE	HA	6-40	NP	7000 DH, 31 LP (estimate)	30	32 bytes (typical), 128M bytes (expand)	2.68	60	32	CX/UX, CX/RT	Both	64/32	60	$75,000 with 1 Night Hawk 3000 CPU, Floating Point accelerator, 64K-byte memory cache, 8-slot Harris VME bus, I/O backplane, console processor with CRT terminal, 10-in. curb, CX/RT 32-user license, Harris compiler
	Night Hawk series Model 3000	NP	SE	NP	6-40	NP	7000 DH, 31 LP (estimate)	60	32 bytes (typical), 128M bytes (expand)	2.68	160	32	CX/UX, CX/RT	Both	160/64	32	$115,000 with 1 Night Hawk 3000 CPU, Floating Point accelerator, 64K-byte memory cache, 8-slot Harris VME bus, I/O backplane, console processor with CRT terminal, 10-in. curb, CX/RT 32-user license, Harris compiler
Intel Scientific Computers (503) 630-7620	iPSC/2 Concurrent Supercomputer	July 1988	SE	DEC VAX 8600	512 (peak)	100-400, 64 bits processor (S), 984, 64 bits processor (P)	64 MFLOPS LP (actual), 64 bits precision	62 per node	16-2048	4M (burst) or 2.8 (sustained)	NP	127	Unix System V, Release 3	Ethernet	128/4	32	$165,000 with 16 nodes, 1M byte memory per node, 1 workstation, 1 disk, 1 tape drive
Mainframe Computer, Inc. (800) 489-0999	Mainframe Three- 7/300, 14/600, 28/900	January 1987	SE	IBM 3090/600, VAX 8600	64-900	38 (S), 53-60 (P)	30 LP (actual)	190-130	16-512	1.5-8.0	30	Two	Theos/Unix, BSD 4.3 Unix	Ethernet	96/64	256-1024	$387,500 with 16M bytes memory, 1 console, 474M-byte disk, 9T-byte cartridge, 16 ports, 1 channel
Numerix Corp. (617) 864-2500	NMX-464 Attached Vector Processor	April 1987	SE	NA	NP	12-34 (P)	1.1 LP (actual)	125-250	Up to 60	NP	Three	NP	VMS	No	1/1	64	$55,400
	NMX-332 Attached Vector Processor	May 1987	SE	NA	NP	34 (P)	2.2 LP (actual)	125	Up to 64	NP	Three	NP	VMS	No	1/1	32	$45,900
	NMX-432 Attached Vector Processor	August 1988	SE	NA	NP	32 (P)	2.6 LP (actual)	100	Up to 64	32	Four	NP	VMS	No	1/1	32	$64,000
Scientific Computer Systems Corp. (800) 544-1515	SCS-40/200	NP	SE	IBM 3090/VF	17	34 (S), 28 (P)	9 LP (actual)	40	16-1024	1.5-11.5	NP	Four	Unicos (Unix V.2), Cray Open Software Interface	Both	32+/16	64	$800,000 with 16M bytes memory, 4 channels, power supply
	SCS-40/280	June 1988	SE	IBM 3090/VF	28	46 (S), 44 (P)	14 LP (actual)	40	16-1024	1.5-11.5	NP	Four	Unicos (Unix V.2), Cray Open Software Interface	Both	60 +/16	64	$450,000 with 32M bytes memory, 4 channels, power supply

VENDOR	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE IBM OR DEC SYSTEM	PERFORMANCE (MIPS)	PERFORMANCE (MFLOPS)[2]	BENCHMARK[3]	MACHINE CYCLE TIME (NSEC)	MEMORY (MEGABYTES)	DISK TRANSFER RATE (MEGABYTES/SEC.)	NUMBER OF PORTS	NUMBER OF CHANNELS	OPERATING SYSTEMS	SUPPORTS ETHERNET OR TOKEN RING	NUMBER OF USERS: MAXIMUM/TYPICAL	WORD LENGTH (BITS)	BASE PRICE
Scientific Computer Systems Corp. (415) 540-1512	SCS-40/MP (two-processor model)	July 1988	SE	IBM 3090VF	44 (expandable)	60 (S), 60 expandable (P)	12 LP (actual)	45	32-1024	1.5-13.5	NP	Four	Sterix (Unix V.3), Cray Operating System (COS), Cray Transferring System (CTSS)	Both	64+/30	64	$845,000 with 32M bytes memory, 60/64-byte disk, 1 tape drive, 16 terminals, 4 channels, expandable I/O processor
Star Technologies, Inc. (714) 768-6400	ST-50	February 1987	SE	NA	NP	50 (S), 50 (P)	NP	80	8-64	10	Three	NP	Array Processor Monitor (Proprietary)	NP	16/1	32	$90,000 with 3 ports, 2 million words of memory
Tarafata Corp. (213) 837-0777	DEC/1012	December 1987	DP	IBM 3090	NP	NP	3000 trans/sec. DC (estimate)	60	4M-4G bytes	1.1	NP	NP	TOS (Tarafata Operating System)	Ethernet	60,000/ 200-300	32	$200,000 with 6 processors, 12M bytes memory, 2.2 DASD Gbytes, system console, host software
Thinking Machines Corp. (617) 876-1111	Connection Machine (CM-2)	September 1987	DP, SE	NA	2500	2,500 (S), 31,00 (P)	NP	NP	512	25	Eight	NP	Unix, Symbolics	Ethernet	8/8	NP	$1 million-$5 million
Unisys Corp. (213) 973-7000	Integrated Scientific Processor System	June 1988	DP, SE	IBM 3090 with vector facility	NP	130 (P)	19.96M LP (actual)	30	8-64	2.5	NA	Four-176	OS/1100	NP	NA/NA	72	$5 million with base 1100/91 support system



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Molecular machines

Tiny computers based on nanotechnology — the next generation after semiconductors

BY JON ROLAND

We are nearing the limits of semiconductor technology.

We have been proceeding in steps. Each step involves halving the linear dimensions of the active elements of semiconductor devices, resulting in a doubling of speed and a quadrupling of capacity.

But we can expect to take only four or five more such steps before both reliability and yields in the production of such devices become unacceptably low.

At that point, a signal will consist of cascades of only a few hundred or thousand electrons, easily disrupted and difficult to control.

Then what will we use to process data? Scientists have long speculated on the possibility of constructing molecular computers.

In *Engines of Creation*, K. Eric Drexler discussed this possibility, calling it "nanotechnology," since molecules have the dimensions of nanometers (billionths of a meter) — about a thousand times smaller than the scale of present semiconductor elements.

Nanotechnology is a revolution whose effects will be even more pervasive and profound than those brought on by semiconductor logic devices.

We can expect to achieve major breakthroughs before the end of the century that will enable us to custom-build single molecules that can store and process information and fabricate other molecules.

Roland has been researching the subject of molecular machines for more than 10 years. He is a computer consultant and director of the Vanguard Institute, a research organization located in San Antonio.

CHRISTOPHER BING

In nature, molecular machines already exist. Natural bioforms are assemblages of such devices at the lowest level, albeit somewhat haphazard ones.

The most prominent examples of these bioforms are DNA and RNA and the enzymes that assist in their reproduction and repair.

In the laboratory, we have seen the development of simple molecular machines for particular purposes by modification of some of these natural molecular machines. Artificial antibiotics and interferon are examples of this.

A whole new ballgame

But the kinds of molecular machines we can expect to develop are not just minor variants on biological originals. They are wholly new types of systems with many functions, only some of which may be biological.

Recent work in such diverse fields as molecular biology, thin-film chemistry, high-temperature superconductivity, flat-screen technology, X-ray lithography, charge-coupled devices, neural-net architectures and atomic-scale microscopy is converging on what may be the ultimate technology: the ability to build single, custom-designed molecules and assemble them into systems of arbitrary size and complexity.

And just as we conveniently divide existing digital devices into those that only process information — computers — and those that move or process materials or energy — robots — so can we expect to divide molecular machines.

These divisions can be termed molecular logic devices (MLD) and programmable molecular effectors (PME), respectively. PMEs are capable of programmed movement and manipulation of their environment, especially atoms and other molecules.

PMEs could perform functions on other molecules such as acquisition, storage, transport, fabrication or repair.

They could mass-produce useful molecules from raw chemicals or by tearing down other complex molecules. What they mass-produce could include more of themselves or improved versions of most of the material products of our civilization. Thus, they could largely end economic scarcity and cure every variety of disease.

In a dramatic example, PMEs and the raw chemicals needed to make a product could be thrown into a vat, and after a few minutes or hours, we would have the result — an automobile perhaps, or a steak already fried. PMEs could be made that could be injected into the body to seek out and destroy disease organisms or cancer cells or undo the damage caused by multiple sclerosis or Alzheimer's disease.

But Drexler and others have also warned of the danger that such devices could get out of control.

Small PMEs might be capable of living and reproducing in the terrestrial environment, competing with natural life-forms and rapidly displacing them.

This "grey goo" scenario is thought to be unlikely by most, but we must be careful what we release into the environment.

Standard features

MLDs would replace semiconductor logic devices, although we may see an intermediate technology — quantum effect devices — along the way. MLDs, with a linear scale a thousand times less than present semiconductor devices and three-dimensional instead of

- **A new kind of self-improving life-form**
- **Beware the "grey goo" scenario**
- **Japanese lead development efforts**

two-dimensional, might be a thousand times as fast and have a billion times the capacity of present microprocessors and random-access memory chips of similar size.

These devices need not be limited in size, as semiconductor devices are now.

And although the speed-of-light limit might make it difficult for a device larger than about 10 centimeters across to be internally synchronous, asynchronous devices of arbitrary size could be possible.

How would they be made?

The programming of many PMEs might be fixed — hard-wired into their structure at the time of their creation. Others, however, might contain MLDs as subsystems to control their functions, just as microprocessors and RAM chips are made a part of many of the active machines being designed and built today.

For MLDs, many designs are possible. One that seems especially promising would consist of 3-D arrays of molecular switching nodes, perhaps based on the principle of the Fredkin Gate, in which signals are conveyed by single ballistic electrons from node to node along molecular waveguides.

> PMEs could be injected into the body to destroy disease organisms or cancer cells or undo the damage caused by multiple sclerosis or Alzheimer's disease.

Each node might be fairly simple, as in an array used for data storage, or the nodes might also consist of molecular nanoprocessors, each with its own local memory, arranged in massively parallel arrays of arbitrary size.

We can envision a parallel processor the size of a human brain having more than a quadrillion nodes.

Certain uncertainty

A logic device that made use of single particles — such as electrons or photons — as message carriers would not work the same way every time because of the Heisenberg Uncertainty Principle of physics.

The principle limits the precision with which both the position and momentum of a single particle can be known and controlled.

Moreover, at normal terrestrial temperatures, such particles are also subject to thermal and other kinds of perturbations.

Semiconductor devices currently in use cope with this indeterminacy of single electrons by the redundancy of using cascades of thousands or millions of them as signals.

But as such devices get smaller, the number of electrons in a cascade becomes smaller, too, causing reliability to then go down.

For MLDs to operate reliably, especially at normal terrestrial temperatures, and despite such perturbations as radiation, they will also need to use redundancy.

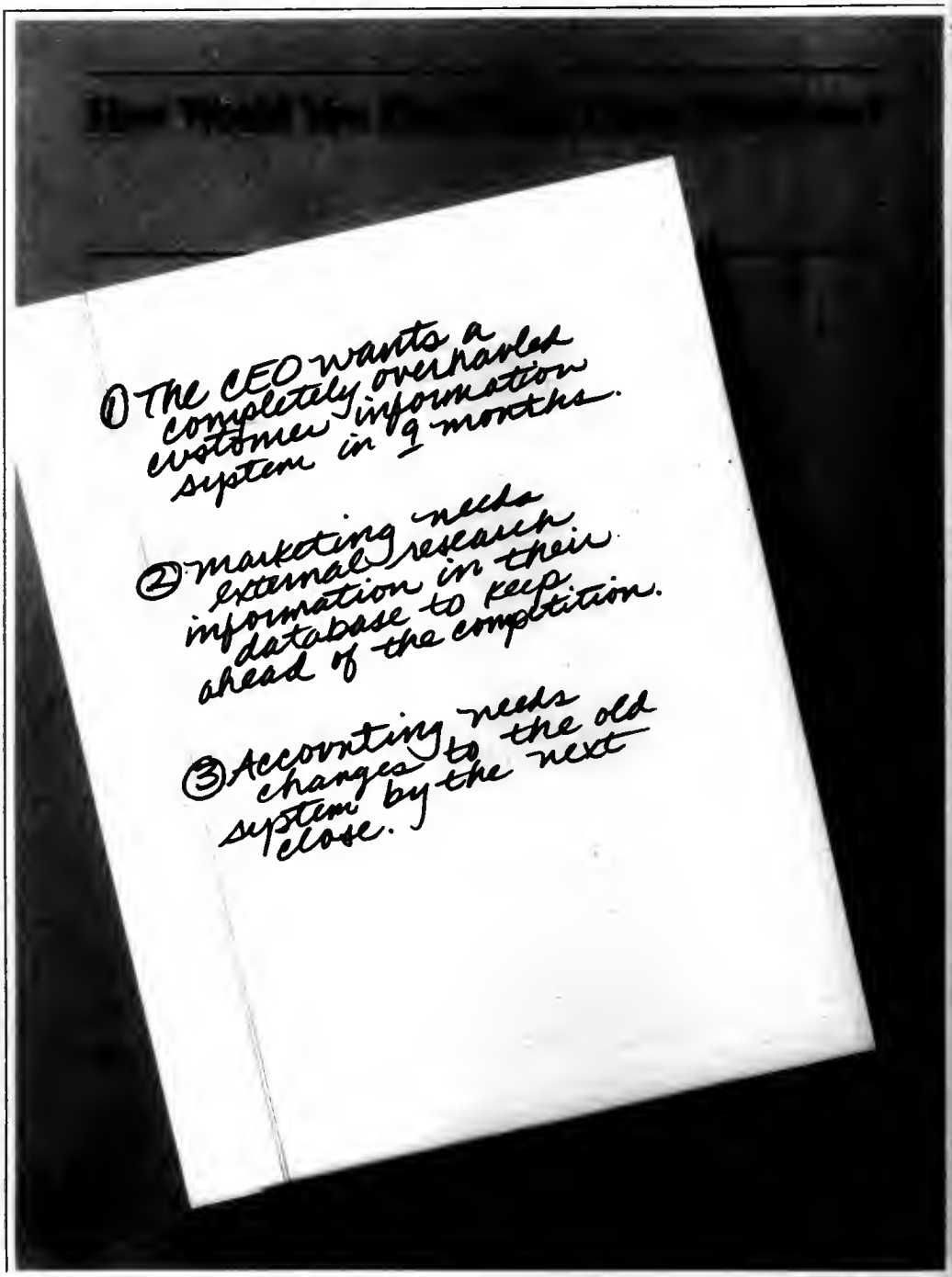
But in MLDs, this could be done by having their logic functions duplicated at widely separated nodes in the array and using error-correcting codes and voting logic to compensate for the electrons that will go astray.

Therefore, any reliable MLD will have to make use of some of the techniques that are used in fault-tolerant systems being built today.

How might the first such device be constructed? One approach is an extension of current work in molecular biology, which might lead to highly modified cells, viruses or virus-like PMEs that could lay down at least the substrate for such a device.

It might then be further structured or permanently "nanocoded" using other such modified bioforms or PMEs to do the coding. Another approach makes use of the tendency for certain polymers, such as some lipoproteins, to form highly regular two-dimensional lattices when stretched into thin, monomolecular films.

Some lattices of this kind are highly resistant to defects and impurities, so much so that it is



possible to construct large films extending over several centimeters with no defects or impurities whatsoever.

It is possible that we could find some way to structure such a lattice as it is formed or immediately afterward, perhaps using X-ray scanning.

Such films might then be laid down, one on top of another, with the layers bonding like a zipper, until one had a multilayer molecular array organized into active logic elements.

MOLECULAR LOGIC DEVICE technology will, however, probably truly be the end. It will take us to the limits imposed on us by quantum electrodynamics.

Yet another construction approach stems from scanning tunneling microscopy and the related techniques of atomic force and magnetic force microscopy, in which probes are moved across a specimen to detect individual atoms.

We can envision similar techniques that deposit or manipulate the atoms in a molecule, one at a time.

Such an approach might not be suited to mass production of custom molecules but could very well be used to fabricate prototype PMEs that could in turn fabricate other PMEs or MLDs, including more of themselves.

We can envision what a synchronous MLD constructed using the layering approach might look like.

To both maintain internal synchronicity and provide access, it might be a sheet about 10 centimeters square with a thickness of perhaps only a few microns.

What could they do?

One of the functions of the active elements on the outside layers of the lattice design might be to change their response to light, so that the entire outer surface of the MLD might function as a holographic interface with the outside world.

The holograph could function either as a display for viewing by human users or as a high-bandwidth channel to I/O processors that would then convert all of the information into other forms.

Such a holographic interface might function as both a camera and a display, so that a pair of such MLDs, connected to one another over a high-bandwidth channel, could each display what the other sees, in full color and in three dimensions.

Imagine slicing a pane of window glass into two thinner panes, then separating them and being able to see through each to what is on the "other side" of the other.

An MLD would probably need little power. It might run on available light or on temperature or pressure gradients. Such MLDs might be further stacked or otherwise connected into vast systems.

This technology, however, may not be achieved in a single step. More likely it will be reached through intermediate steps, just as we have previously gone through various scales of integration in semiconductor devices.

MLD technology will, however, probably truly be the end. It will take us to the limits imposed on us by quantum electrodynamics.

Any logic device of smaller scale would be inaccessible, if it could be constructed at all. It appears unlikely that elementary particles could form the kind of stable, complex structures needed for logic systems at the subatomic level.

The final frontier

How soon might we be able to construct a first-generation MLD, and how soon might we reach the final generation? Perhaps much sooner than many people think.

The often-repeated remark about this is that optimists expect it to happen in 30 years and

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pessimists expect it to happen in 10.

A lot depends on how much money is made available for research and also on the vision of researchers in fields that lead to it.

Recent work in several laboratories around the world — such as those at IBM's Almaden facility in San Jose, Calif., Carnegie-Mellon University and several in Japan — suggests that we might be only a few years away from the first working prototype and that a major development effort might produce commercial products before the end of the century.

With sufficient development funding, it might take as little as 20 years after that to reach the takeoff point, after which the development process would be able to proceed without further human participation.

But development funding is as yet scattered and inadequate. Most development efforts leading to nanotechnology have lacked a vision, on the part of most researchers, of where they might ultimately lead.

MOST development efforts leading to nanotechnology have lacked a vision, on the part of researchers, of where they might ultimately lead.

Only the Japanese have, until recently, had the development of PMEs and MLDs as conscious goals, and they have a significant lead in research in this field.

Not since sliced bread . . . When it matures, molecular technology could explode on the scene in a way unlike anything since the appearance of the first natural life-forms.

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Self-improving molecular machines could achieve in seconds what it would take human beings many generations to do; they could reach heights of material power and intellectual accomplishment that we can hardly imagine possible.

Molecular machines could replace us or serve us.

If they replace us, they may preserve the essense of our humanity or even immortal copies of human memories and personalities who will live in an eternal world of molecular dimensions. Or they may not.

They may move on, leaving human consciousness and human concerns behind as obsolete relics of a brief transitional phase in the evolution of organized matter.

If they serve us in our present form, they may do it all too well, with results as disastrous as a mortal plague.

Human beings are not designed to function responsibly in an environment of almost unlimited abundance.

Unfortunately, human beings are also not very well designed to function in the environment they have already created for themselves.

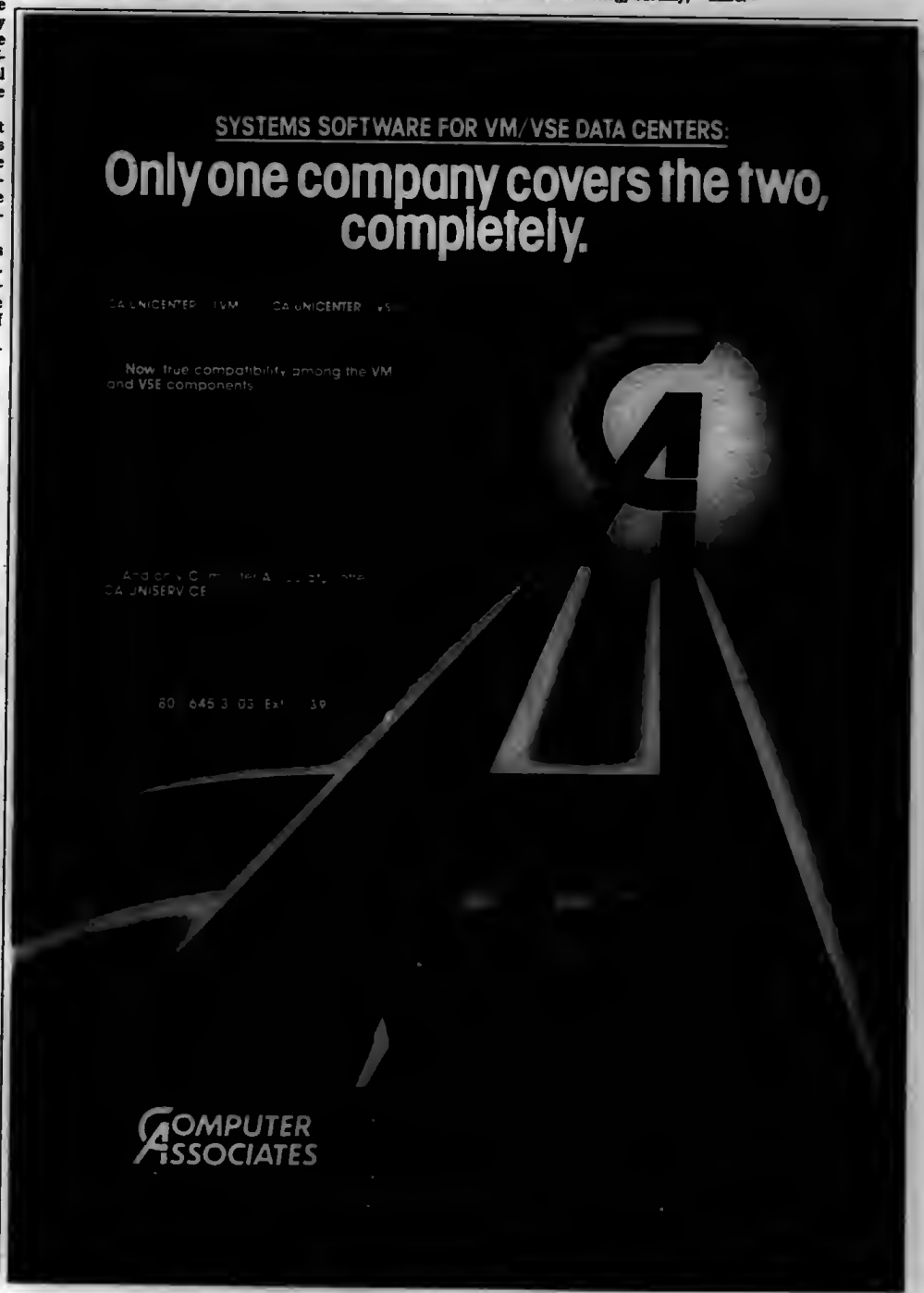
We, or at least some of us, have been smart enough to create problems for ourselves that we may not be smart enough or even responsible enough to solve.

Molecular technology may provide the only way to solve many of those problems, and even if it brings some hazards, the lack of it may lead to almost certain disaster.

It may not be an exaggeration to say that the first country or organization to develop such technology may not merely dominate the market for the products of such technology but may, quite literally, rule the world. If they are not careful, they could also destroy it.

PMEs are potentially more dangerous than nuclear weapons.

We can preserve and build upon the best of humanity and civilization to reach new heights, or we can turn down a dark road toward a science fiction nightmare. •



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MANAGEMENT

TAKING CHARGE

James Connolly

It's the little things in life

Think of the vast difference that exists between the two types of systems projects that tend to catch the executive eye.

The first is one that automates basic tasks so that employees can do the same work more efficiently. Such projects, typified by word processing systems, are simple by today's standards.

The second class of project is the megaproject category, with such efforts lasting between three years and eternity and costing tens of millions of dollars.

That type, which the General Services Administration recently lambasted as the Grand Design approach, can prove to be long-term folly in some cases — such as some federal efforts that fueled the GSA criticism — or can positively revolutionize industries, as computerized distribution systems did for companies responsible for stocking storeroom shelves.

The goals of those systems go beyond automating tasks so that workers can do their jobs better. They place new information in the hands of people who

Continued on page 99

Unfounded fears?

Jobs redefined, not eliminated, by expert systems

BY JAMES A. MARTIN
SPECIAL TO CW

In the early 1970s, it was office automation that was supposed to put thousands out of work. In the '80s, that same fear has been applied to expert systems.

The growing implementation of knowledge-based software in corporate America's computer centers and work groups is having an impact on jobs, to be sure. But expert systems apparently are redefining positions, not eliminating them.

At Security Pacific Corp., for example, three of the four workers in the bank card department in charge of investigating debit card fraud were redeployed after an expert system was installed.

"One of the four is still involved with fraud detection," said Koenraad Lecot, vice-president of Security Pacific's corporate security department in Los Angeles. "When an expert system makes a decision, there still needs to be a human investigator to make the final decision. They take the suggestion of the expert system and do some follow-up.

"The other three were reassigned. They make phone calls to branches, they talk to the staff about fraud schemes. They do things that cannot be automated," Lecot continued. "They stayed in the same department; they're just doing a different type of work."

Out of the rut

As a result of the expert systems program — which Security Pacific developed for operating on a Digital Equipment Corp. Microvax 3600 — the bank card fraud investigation efforts became more efficient, and the staff benefited as well. "The expert system does a lot of what was routine to them, and now they can do things that are more interesting," Lecot said.

That sentiment is echoed by other companies with expert systems projects and programs. At United Airlines, for example, an expert system assigns gates at Chicago's O'Hare Airport for incoming flights, a task once performed manually.

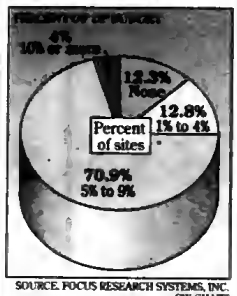
"We've not replaced anyone;

Continued on page 100

Data View

Training dollars

A review of 10,000 IBM and plug-compatible sites revealed that most allocate less than 10% of their DP budgets to training and education



SOURCE: FOCUS RESEARCH SYSTEMS, INC.
CW CHART

Facing, welcoming, implementing change

BY ROSEMARY HAMILTON
CW STAFF

For nearly two years, Ron Cipolla, corporate director of MIS at Kendall Co., has been sending out a message to his staff: Change is good.

Three simple words. But Cipolla says he has found that the simplicity ends there.

Since late 1986, Cipolla has been guiding his staff through a major restructuring in which a centralized group based in Boston was transformed into a decentralized MIS group spread throughout the country. A second and simultaneous shift is moving MIS away from a mainframe-based operation to a networked IBM minicomputer environment.

One other big change occurred last week when Kendall's parent company, Colgate Palmolive Co., sold the Boston-based health-care products company to the Kendall management team and leveraged-buyout specialist Clayton & Dubilier, Inc. in New York. Kendall will become a privately owned company again, and Colgate will receive approximately $960 million.

As of last week, Cipolla said the sale should not bring changes to MIS because the current management at Kendall will stay in place.

That's good news to Cipolla, who has a full plate of changes for his department already. "This is not without it's problems," Cipolla says of the changing MIS environment. "But it hasn't been as traumatic as I'd thought it would be."

PROFILE
Ron Cipolla

***Position:** Corporate director of MIS, Kendall Co.*
***Philosophy:** Change is good — but it's not always simple.*

Rocky time

The 44-year-old Cipolla took over the role of MIS chief when Kendall, a $1.1 billion company, was first implementing the decentralization plan.

The health-care products company, founded 85 years ago, restructured its divisions, which produced such products as generic drugs, intravenous solutions and adhesive tape, as separate business units. A critical component of this strategy was the decision to have MIS dovetail the corporate change. That meant re-educating 250 people in both a new management style

Continued on page 101

Getting into many people's business

BY JEAN S. BOZMAN
CW STAFF

CHICAGO — It was the ancient scientist Archimedes who explained the principle of leverage by saying: "Give me where to stand, and I will move the earth."

It was Bill Smith who applied that principle in building his company, Smith, Bucklin & Associates, Inc., from its starting point in Chicago 40 years ago into one of the country's largest firms devoted to association management.

Smith Bucklin uses its own Chicago address at 111 E. Wacker Drive — overlooking the confluence of the Chicago River and Lake Michigan — as the business address for dozens of organizations.

From here, the firm handles the business affairs of the three largest IBM users groups, Guide, Inc., Share and Common, among a total of 140 client organizations. The clients range from professional and trade associations to users groups, including the International Tandem Users Group.

The place to be

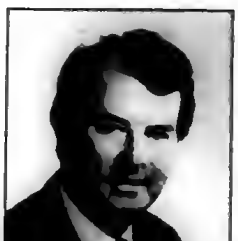
Smith, who grew up here, joined the management consulting firm, which now bears his name, in 1948. During the intervening years, it has grown into a $50 million firm, he said. Smith's explanation of why it is one of the nation's largest association managers is this: "Chicago is still the hub of the country. It's the logical place to headquarter an association."

In order to serve its clients, Smith Bucklin's staff books hotel space, plans conventions, prints newsletters and handles advertising. It even owns its own travel agency, Association Travel, which books many of the special packages for trips to convention cities.

"We collect the money, we spend the money and we control the money, all under the aegis of the association's treasurer," Smith explained. "They're the boss. We're the hired help."

Even as Smith Bucklin's staff manages associations from behind the scenes, the client's elected board remains on center stage, Smith said.

The concept is that an association's elected officials — most of whom also have full-time jobs — should focus on the content rather than the form of their association's meetings.



Smith Bucklin's Bill Smith

"Ideally, Smith Bucklin disappears into the woodwork," Smith said. "It's the members and the board who should be on view."

Guide president Gary Gesme, whose IBM mainframe users group meets three times a year, would not have it any other way. "I'm not interested in negotiating with hotels for space," Gesme said. "I want to deal with issues confronting the data processing industry." Gesme said that a full-time Smith Bucklin account executive manages the $3 million that Guide receives annually from its 2,800 member organizations. Guide has been managed by Smith Bucklin since 1973.

Economy of scale, by virtue of its relatively large size, allows

Continued on page 99

Inside

- New heads for Share. Page 96.
- Business no-nos. Page 96.

MANAGEMENT BRIEFS

Guiding technology standards

Two key organizations in the field of information technology in higher education have released **"Evaluation Guidelines for Institutional Information Technology Resources"** to provide colleges, universities and regional accrediting associations with a framework for developing their own standards for information technology resources.

The board of trustees of **Educom** and the board of directors of **Cause** endorsed the guidelines, which address areas that should be examined in assessing the integration of information technology relative to the institution's mission. The guidelines were developed by a committee composed of three members of each organization.

Carnegie-Mellon University's Daniel P. Siewiorek is the winner of the 1988 Eckert-Mauchly Award, which is given by the Association for Computing Machinery and the Computer Society of the Institute for Electrical and Electronics Engineers for technical contributions to computers and digital systems architectures.

Siewiorek, a professor of computer science and electrical engineering, was cited for helping to develop a 50-processor system, for participating in the Army/Navy Military Computer Family Project and for directing construction of the C.vmp triply redundant computer.

The Chicago-based management consulting firm **A. T. Kearney, Inc.** recently expanded its information management arm with the acquisition of the JIA Management Group, Inc. in Santa Monica, Calif.

A. T. Kearney plans to combine the JIA Management Group with its information technology practice and to focus the practice's consulting on strategic planning, systems architecture, project management, change management, computer-integrated manufacturing, systems integration and systems design.

Recent calls for participation and papers include the following:

- **The Usenix Technical Conference,** scheduled for Jan. 30-Feb. 3 in San Diego, is soliciting papers on Unix-related topics. Papers should be submitted by Oct. 7 to Greg Hidley, CSE Dept. C-014, University of California at San Diego, La Jolla, Calif. 92093.
- **The MSC World Users Conference,** sponsored by the MacNeal-Schwendler Corp., is soliciting abstracts of papers until Sept. 30 for the conference scheduled for March 13-17 in Los Angeles. Questions can be addressed to Robert Louwers, MacNeal-Schwendler Corp., 815 Colorado Blvd., Los Angeles, Calif. 90041.
- **Infolan 89,** a conference and exhibition relating to local-area network hardware and software, is looking for reports on research and applications. Infolan 89 will be held April 25-26 in Dallas. Information is available from Infolan 89, P.O. Box 2323, Austin, Texas 78716.

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Firms cite top faux pas

Criticizing a subordinate in front of others was placed at the top of the list of the biggest breaches of business etiquette in a survey of 100 of the country's 1,000 largest corporations.

The survey, commissioned by Robert Half International, Inc., a San Francisco-based employment firm, found that those who dressed down employees in public violated the cardinal rule of business manners. Other no-nos were ranked as follows:

- Not giving others an opportunity to express themselves (28%).
- Off-color jokes or inappropriate attempts at humor (15%).
- Being late for appointments (6%).

Robert Half, founder of the company, said he has been doing random surveys of current issues since 1970. The results often surprise him.

"I would not necessarily put [public criticism] first. I think being late for an appointment is an affront," Half said. He noted that the organization has spent years looking into "time theft" but has not dedicated much study to public criticism.

Share fills its slate of officers

CHICAGO — The IBM large systems users group Share, Inc. recently elected a new slate of officers, including Cornell University's Cecilia Cowles as president.

Cowles and the other officers and directors will serve until 1990.

Others elected include Sandy Moy of the University of Illinois as vice-president, Anne Caluori of the U.S. Army Information Systems Command as secretary and Terry Burr of the Canada Systems Group as treasurer. James Pittman Jr. of Deposit Guaranty National Bank and Alan Williams of Pennsylvania State University were elected to the board of directors.

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August 15th, 1988.

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Subj: Maintenance charges, all Bennett products.

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It's time to break from tradition once again.

The MIS executives that I speak with every day are in agreement on one basic issue: The rising cost of yearly vendor software maintenance is becoming a genuine concern.

In the past, most software cost justifications focused on base prices and largely ignored the yearly maintenance costs. Vendors know this and exploit the issue. Some vendors impart 20% fees, or more. The more unscrupulous vendors will set base license prices at double what the product's are worth, then cut a discount deal off the list price by 50% to 75%. This assures them of a fat maintenance check every year, based on the nondiscounted list price.

Honest vendors require maintenance to pay for enhancements and developments that are due the customer, and keep the customer's investment abreast with the latest technologies. In theory, "maintenance" should not be used as a high profit "wrench" to use against customers. Recent maintenance increases, across the market, are causing major concerns in most data centers, especially when many of these products haven't been enhanced in years.

In an effort to force moderation from our competitors and give our clients relief, Bennett Software is announcing a reduction in yearly maintenance fees from 15% to 12%, retroactive to January, 1988. All customers paying in excess of 12% during 1988, will be reimbursed. This maintenance level will be frozen for 18 months, or until March 1st 1990. Base initial license fees, for all current and newly developed products, will be fixed, for the same period. We will continue our practice of providing site licenses, rather than CPU licenses, throughout.

It's time for a change.

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CALENDAR

SEPT 18 24

Using National Conferences. Denver, Sept. 19-21 — Contact: Salme Maimuri, US West, Room 950, 2CPP, 100 S. 19th St., Omaha, Neb. 68102.

Performance/Capacity Management Tutorial Week. Chicago, Sept. 19-22 — Contact: Institute for Information Management, Suite 230, Pruneyard Tower, 1901 S. Bascom Ave., Campbell, Calif. 95008.

Policy Management Systems Corp. Customer Conference. Columbia, S.C., Sept. 19-23 — Contact: Policy Management Systems Corp., One PMS Center, Blythewood, S.C. 29016.

Showcase Conference III. CASE Tools: The Future of Applications Development. St. Louis, Sept. 20-21 — Contact: Donna Skaggs, Conference Coordinator, Washington University, Campus Box 1141, One Brookings Drive, St. Louis, Mo. 63130.

VAX Users Show. Toronto, Sept. 20-21 — Contact: VAX Users Show, The Producers, 360 Merrimack St., Lawrence, Mass. 01843.

Aerospace and Defense Computing '88 Conference and Exposition. Los Angeles, Sept. 20-22 — Contact: Norm De Nardi Enterprises, No. 204, 289 S. San Antonio Road, Los Altos, Calif. 94022.

Annual 1100 Data Center Management Conference for Users of Unisys 1100 Computers. Denver, Sept. 20-23 — Contact: Datametrics Systems Corp., 5270 Lynpate Court, Burke, Va. 22015.

International Conference on Improving Software Quality and Productivity. Toronto, Sept. 21-23 — Contact: Quality Assurance Institute, Suite 350, 7575 Dr. Phillips Blvd., Orlando, Fla. 32819.

SEPT 25 OCT 1

The Colpepper Forum. Atlanta, Sept. 25-27 — Contact: Colpepper and Associates, Suite 75, 400 Perimeter Center Terr., Atlanta, Ga. 30346.

ABA National Bank Card Conference. San Francisco, Sept. 25-28 — Contact: American Bankers Assn., 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

OOPSLA 88. Association for Computing Machinery Conference on Object-Oriented Programming Systems, Languages and Applications. San Diego, Sept. 25-29 — Contact: Barbara Noparstak, Digitalk, Inc., 9841 Airport Blvd., Los Angeles, Calif. 90045.

SCAT '88: Smart Card Applications and Technology Conference. Washington, D.C., Sept. 25-28 — Contact: The Information Exchange, 3925-I S. George Mason Drive, Falls Church, Va. 22041.

Omni User Technical Conference. Oak Brook, Ill., Sept. 28 — Contact: The Omni User, P.O. Box A 3031, Chicago, Ill. 60690.

Communications Network Disaster Recovery and Planning Conference. San Diego, Sept. 26-27 — Contact: Telestrategies, Suite 100, 1355 Beverly Road, McLean, Va. 22101.

Conference on Third-Party Maintenance of Computers, Data Communications and Office Automation Equipment. San Francisco, Sept. 26-27 — Contact: Frost & Sullivan, 106 Fulton St., New York, N.Y. 10038.

State Deregulation and Competition Issues: Third Annual Conference. Arlington, Va., Sept. 26-27 — Contact: Telecom Publishing Group, Suite 444, 1101 King St., Alexandria, Va. 22314.

Association for Computing Machinery Conference On Computer-Supported Cooperative Work. Portland, Ore., Sept. 26-28 — Contact: ACM, 11 W. 42nd St., New York, N.Y. 10036.

Software Maintenance/Management Conference, sponsored by Data Processing Management Association Education Foundation. Tysons Corner, Va., Sept. 26-28 — Contact: U.S. Professional Development Institute, Suite 221, 1734 Elton Road, Silver Spring, Md. 20903.

CD-ROM Expo. Chicago, Sept. 26-29 — Contact: Dorothy Ferriter, IDG Conference Management Group, P.O. Box 9171, Framingham, Mass. 01701.

Telecom West. Scottsdale, Ariz., Sept. 26-28 — Contact: Center for Professional Development, College of Engineering and Applied Sciences, Arizona State University, Tempe, Ariz. 85287.

Interop 88, the TCP/IP Interoperability Conference and Exhibition. Santa Clara, Calif., Sept. 26-30 — Contact: Advanced Computing Environments, Suite 100, 480 San Antonio Road, Mountain View, Calif. 94040.

Systems Analysis Workshop. Savannah, Ga., Sept. 26-30 — Contact: Hammond & Associates, 7803 Wilson Ave., Baltimore, Md. 21224.

Open Systems Opportunities and Challenges in the 1990s. Boston, Sept. 27 — Contact: IDC Technology Services Group, 5 Speen St., Framingham, Mass. 01701.

Canadian High Tech Show. Toronto, Sept. 27-29 — Contact: David Zimmerman, Canadian Standards Association, 178 Rexdale Blvd., Rexdale, Ont. M9W 1R3.

Networld '88. Dallas, Sept. 27-29 — Contact: Networld '88, P.O. Box 1521, Englewood Cliffs, N.J. 07632.

Hewlett-Packard Co. 1988 Technical Value-Added Business (VAB) Conference. Monterey, Calif., Sept. 27-30 — Contact: Doug Newlin, Hewlett-Packard, Technical Systems Sector, VAC Marcom, 3404 E. Harmony Road, Fort Collins, Colo. 80525.

Corporate Electronic Publishing Systems Exposition and Conference. Washington, D.C., Sept. 28-30 — Contact: Cahners Exposition Group, 999 Summer St., Stamford, Conn. 06905.

SQL: Interfaces, Languages, Engines & Tools. Los Angeles, Sept. 26-30 — Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90420.

Great Southern Electronics & Computer Expo. Orlando, Fla., Sept. 30-Oct. 2 — Contact: Great Southern Computer & Electronics Shows, P.O. Box 655, Jacksonville, Fla. 32201.

OCT 2 8

Conference of the Association of Field Service Managers International. New Orleans, Oct. 2-5 — Contact: Association of Field Service Managers International, Suite B, 6361 Presidential Court, Fort Myers, Fla. 33907.

Honeywell Gcos Users Meeting. Phoenix, Oct. 2-5 — Contact: HLSUA, 6th floor, 4000 Town Center, Southfield, Mich. 48075, or North American Honeywell Users, P.O. Box 3037, Willingboro, N.J. 08046.

NRMA Retail Information Systems Conference. Washington, D.C., Oct. 2-5 — Contact: National Retail Merchants Assn., 100 W. 31 St., New York, N.Y. 10001.

Lasers in Graphics/Electronic Publishing in the '90s Conference. San Diego, Oct. 3-6 — Contact: Lasers in Graphics, 1855 E. Vista Way, Vista, Calif. 92084.

Oracle International User Week. Orlando, Fla., Oct. 2-6 — Contact: Oracle Corp., 20 Davis Drive, Belmont, Calif. 94002.

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Connolly

CONTINUED FROM PAGE 95

can act on it and give their organizations an advantage.

Both types of projects have won a lot more attention than has a third class. The development efforts in this category may appear simple, but they benefit organizations by eliminating the expense of hiring personnel to perform mundane tasks.

This type of system is one that Alamo Rent A Car, Inc. director of Computer and Communication Services Thomas Loane classifies as a "human emulation system" and "the perfect solution for the world's smallest problems."

This is also the type of opportunity that should not be overlooked. Even if companies don't want to view such systems as eliminating employees, managers can look at human emulation systems as automating the mundane tasks that most people don't want to perform, thus freeing those workers to attack more interesting tasks.

Consider some of the results that Loane's group has achieved at Alamo, particularly by building systems based on IBM's High-Level Language Application Program Interface, Lanyon Transport Systems Ltd. airline communications products and tools like Basic.

So sorry . . .

As with any business, Alamo runs into situations in which its inventory cannot meet customer demands. In the case of Alamo and other car rental companies, that means a traveler arrives in a strange city to find no rental car waiting for him.

The car rental companies typically send the customer to a competitor, cover any additional expenses and then send the customer a letter of apology.

At Alamo, a human emulation system handles much of the follow-up work, taking the place of a clerk who would write the letter of apology, coordinate various accounting system transactions and update the customer's personal history.

The system didn't eliminate jobs but let Alamo handle a growing volume of business without adding customer relations personnel.

In another case, Alamo eliminated the need for several clerks by developing a program that interacts with airline reservation systems in updating rental car rates, which tend to be changing somewhere in the U.S. at any given time.

Some airline systems require that rate changes be keyed into the systems in a particular way. The Alamo system intervenes, taking the data from Alamo's own databases and pretending to be a clerk typing the figures into the airline system. It sounds simple, but it saves several salaries.

This discussion doesn't mean that Loane's group is the only MIS organization to see the benefits of automating the simple things in life, and it certainly doesn't mean that big projects are useless.

However, it should serve as a reminder that managers should never overlook the opportunities that sit in front of them and the little problems that, in sum, can cost a lot to not solve.

Connolly is *Computerworld*'s senior editor, management.

Getting into

CONTINUED FROM PAGE 95

Smith Bucklin to keep overhead costs below that of some of its 200 competitors. "We are the IBM of association management companies," Smith claimed.

Competition for prospects is more likely to come from Washington, D.C., than anywhere else, Smith said. Even though many competitors generate less than $1 million annually, there are four or five firms that have as many as 40 client associations, Smith conceded.

Smith Bucklin employs a staff of 300 in Chicago, 110 in Washington, D.C., and 20 in Los Angeles, a region that Smith said is "emerging as the gateway to the Pacific Rim countries."

The firm employs 35 workers in public relations and 20 more who develop statistical analyses and market research data. There are also in-house staffs of artists and newsletter writers, as well as a roomful of accountants whose job it is to handle clients' books.

Training race

Additional but gradual growth is planned. "We can't take on new clients faster than we can train our employees to serve them," Smith said. Aside from computer users groups, clients range from The Pet Food Institute to the Society of Thoracic Surgeons. Despite its size, Smith Bucklin is seldom perceived as the organizer of Guide or Share meetings.

"Somebody's got to be the worker bee to make sure things get done," Smith said. "We know the hotel properties and how the meetings should be set up; we're one of the largest brokers of hotel space in the country."

The conventions that Smith Bucklin set up, while often in Chicago, are just as likely to be far out of town in such Sun Belt spots as Hawaii, Florida or the Caribbean.

Nowadays, the clients are just as likely to be scattered across the nation as they are to be based in the Midwest. "It just happens that we're located here," Smith said. "Less than 10% of our clients are based in the Chicago area."

Although it is privately held, Smith Bucklin does have a total of 22 in-house owners.

Unfounded fears

CONTINUED FROM PAGE 95

we've just made our operations more efficient," said Chris Allen, a spokesman for Covia Corp., a computer operations subsidiary of United.

In addition, Chemical Bank in New York uses a knowledge-based software system to help monitor foreign exchange rate transactions. General Motors Corp. has an expert system to aid in the diagnosis of machine parts in factories. And American Express Co. has an expert system-based credit card authorization program that assists in determining whether to authorize a credit card transaction.

The key words are "help," "assist" and "aid," for expert systems are not designed to replace the human decision-making process but to enhance it, observers say.

"Expert systems have done two things to the work force," said Harvey Newquist, editor of "AI Trends," a report from DM Data, Inc. in Scottsdale, Ariz. "They have improved efficiency in certain job tasks, not just for an individual but for the performance of a whole group or project. Also, they allow people who are using the system to concentrate on less mundane things and use their time where their expertise is needed more. It takes the dull, minute things out of their jobs and assigns them to a computer."

"THE KIND of jobs that don't require much experience — those are the ones that will probably be displaced."

ALAN WESTIN
AUTHOR, PROFESSOR

Before the industrial revolution, for example, a rug maker operated a handloom to design and manufacture his rug. After machines were created for that task, the craftsman's job became easier, but he still had to know how to design a rug.

"The need for his skills didn't go away," explained Tom Roberts, director of development at Gateway Information Services, an expert systems developer serving the insurance industry in Indianapolis. "The only difference was, the rug maker had support in doing his job better and faster."

The main concern, observers say, is not that expert systems will replace workers but that corporations will not implement and manage them correctly.

"The real hang-up is that management needs help defining jobs so expert systems can help their workers," Roberts said. "Most companies just don't know what to do with expert systems yet. The MBAs were taught to reduce costs and focus on short-term profits, but planning for expert systems requires long-range thinking."

While expert systems have not knocked multitudes out of work yet, knowledge-based software is expected to cause some shrinkage in lower and middle-tier white-collar jobs in the future, according to Alan Westin, author of *The Changing Workplace* (Knowledge Industry Publications) and a professor of public law and government at Columbia University in New York.

The real culprits

Overall, however, technology's role in shifting the job market has often been overplayed, while the real culprits in eliminating positions in the 1980s and into the '90s are corporate mergers, downsizing and foreign competition.

"When expert systems are brought in, you're not going to see lots of people laid off," Westin said. "That only happens with a bad profit-and-loss statement or a merger."

As office automation displaced some low-level clerical and secretarial positions in the 1970s and early '80s, expert systems will reduce the need for some low-level positions in the middle-tier job market in the early '90s, Westin said.

"The kind of jobs that don't require much experience — those are the ones that will probably be displaced by expert systems," Westin said. "It's going to take more skills to get the same kind of job you could have gotten with less skills a few years earlier."

At the same time, however, expert systems will help push the motivated worker up the corporate ladder, Newquist said. "They could elevate the lower tier person more quickly because the access to an expert's knowledge is immediate and interactive. There will always be a need for an expert in a company, so the expert system can help teach the junior person and grow with him."

The bottom line is to give workers the best tools to do their job. Or, as Security Pacific's Lecot said, "Our goal was to make our department more productive, not to put anyone out of work."

Martin was previously a West Coast correspondent for *Computerworld*.

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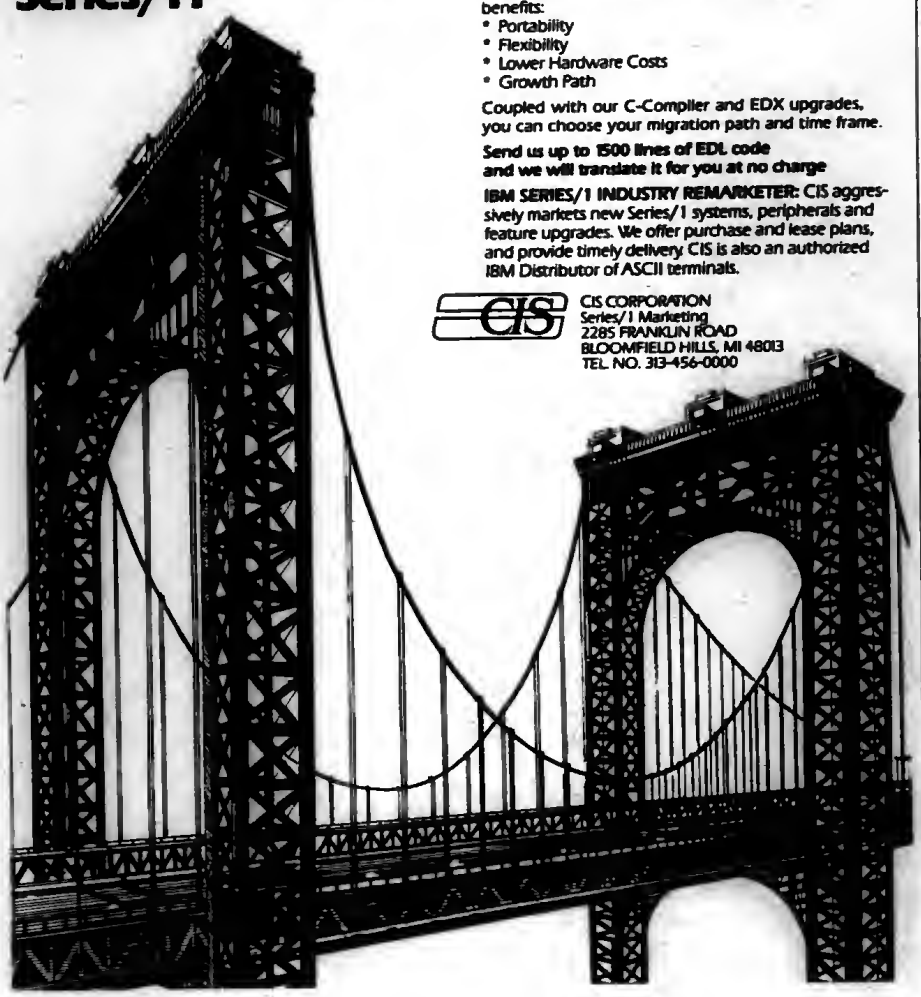

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Change

CONTINUED FROM PAGE 95

and new mid-range platform.

Cipolla, who had been on Kendall's MIS staff for four years, stepped into the chief MIS post at this time. With what he calls a "small is better" philosophy, Cipolla fit in well with the overall corporate goal.

From an earlier stint at which he served as an MIS director at a now-defunct manufacturing firm in Providence, R.I., as well as a brief career as a management consultant at the accounting firm Ernst & Whinney, Cipolla developed this decentralized approach.

"Get rid of the bureaucracy and do the job on the smallest machine possible. That's how I see the world," Cipolla says.

But then it came time to convince his staff.

Cipolla says his first job was to sell the idea of a decentralized MIS to the 135 MIS people at corporate headquarters and the 120 at other locations.

It was a tough sell at headquarters, because approximately 100 of those people would be reassigned to other divisions. Luckily, many of those divisons are clustered around the Boston area, so few employees had to consider relocation.

> "SOMETIMES I'm seen as a cheerleader, sometimes a dictator, sometimes as a source of expertise. All three roles are sometimes necessary."
>
> RON CIPOLLA
> KENDALL

But Cipolla soon found that relocation was not the biggest hurdle. "With a staff of 135 [at headquarters], most of whom are MVS people, you're going to have fallout," Cipolla says. "Twenty to 30 people left — and good people."

Cipolla says this fallout was an expected part of such a big change. By now, he has replaced those people — whose backgrounds were in the IBM MVS and mainframe world — with mid-range-oriented people. This year, he says, turnover was less than 10%.

These days, Cipolla says he continues to encourage both the remaining staff and the newcomers that continuing change is good for them. He uses this pitch: Managing change in your professional life helps you grow as a person.

"It's not an easy thing to get a group of people together that agree with that basic principle," Cipolla says of his motto. "But over time, you retain the people who believe it, and the people that can't deal with it tend to leave. So, you do start to build a consensus."

Cipolla says he focuses on two positive aspects of change to help motivate his people. First, the decentralized structure has set up smaller MIS staffs in each division. Operating in smaller groups, employees tend to have more responsibility under the new structure than they did as part of a big group at headquarters.

"For good employees, more responsibility is a satisfying job environment," he says.

Secondly, Cipolla says that since the decentralized structure is new to Kendall, a lot of pioneering can go on, which can appeal to employees who like to step into uncharted waters.

More to life

For Cipolla, there is more to his job than being a good salesman. His own responsibilities are no longer those of a typical MIS director. Instead, as corporate director of MIS, he oversees several MIS managers and makes sure they follow the corporate strategy.

"The problem with this shift is getting the pendulum in the middle, between autonomy [for each division] and anarchy," he says. "We work on it, and it's still not perfect. Sometimes I'm seen as a cheerleader, sometimes a dictator, sometimes as a source of expertise. All three roles are sometimes necessary."

But Cipolla says the new structure, despite some problems that surfaced as people settled turf wars, has not brought about any major disasters. The divisions make their own decisions, but they must reflect corporate policies, such as the plan to implement IBM Application System/400s.

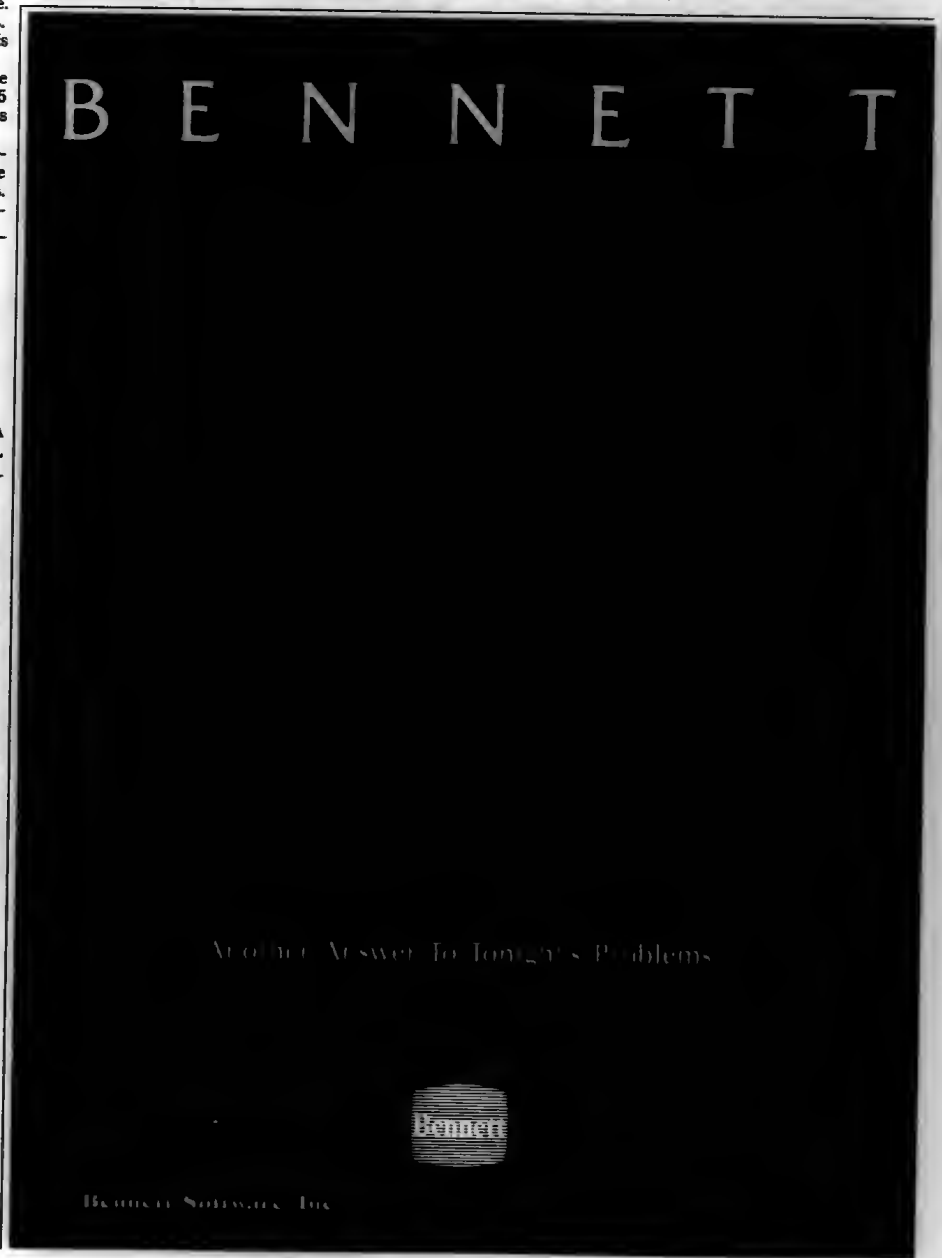
"I listen to their business cases, advise them and generally approve the plan," he says. "I have yet to see a harebrained scheme. My job is to support them. I have faith they know how to do their jobs."

In the case of systems, one division, McGaw Laboratories in Irvine, Calif., presented a sound business case to keep its IBM 3081 mainframe. The division had written several applications to support its IV solutions business because it could not find adequate off-the-shelf software, Cipolla said.

Cipolla agreed that it would be pointless to scrap the mainframe applications for the near future. As a result of the discussion, McGaw will remain exempt from the mid-range standard.

Other divisions, however, have been on schedule in implementing IBM minicomputers. The deadline for mid-range implementation is next month, and the goal is to have all divisions on the new AS/400s by the third quarter of 1989.

In the meantime, some divisions will implement either System/36s or System/38s, while others go ahead with the AS/400.



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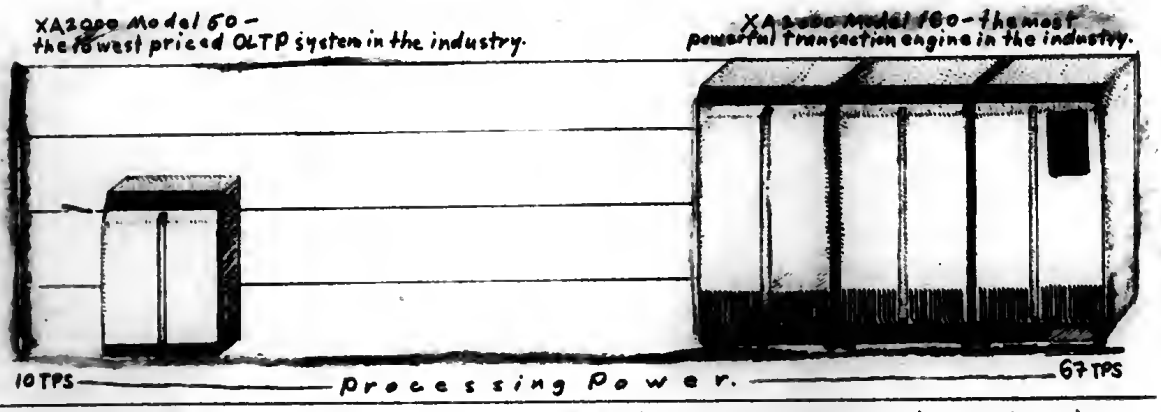

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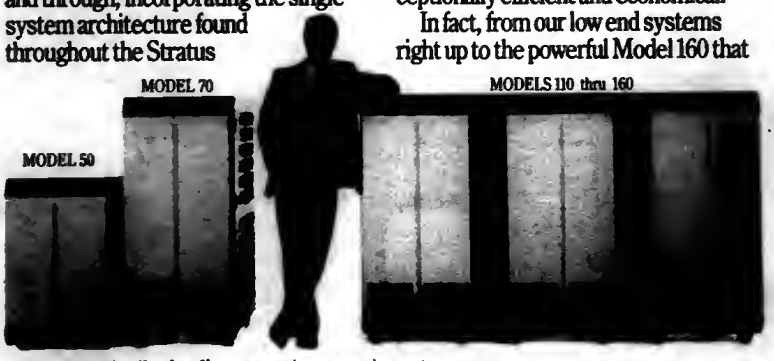

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INDUSTRY INSIGHT

Clinton Wilder

Battles rage, users lose

"There's battle lines being drawn. Nobody's right, if everybody's wrong. . ."

When the rock band Buffalo Springfield sang those words in the late 1960s, U.S. society was sharply divided over the Vietnam War issue. In an explosion of rhetoric and, ultimately, violence, zealots on both sides of the issue took things too far and ended up harming their causes more than helping them.

Twenty years later, 1988 has become the Year of the Battle Lines in the computer industry. The first war zone was Unix, when AT&T opened the year by buying a chunk of Sun Microsystems and forming the Scalable Processor Architecture, or Sparc, team. IBM, DEC, Apollo and others retaliated with the Open Software Foundation, and the battle has been raging all year.

Last week, it was the PC industry, with the rival camps building fortresses on the same day in Times Square and on Madison Avenue. Instead of warring for Manhattan Island, however, the two sides trumpeted their strategies for control of the PC marketplace.

Don't forget Apple, which

Continued on page 107

Troubles confirmed at NAS

BY J. A. SAVAGE
CW STAFF

SANTA CLARA, Calif. — One month after announcing a reorganization of the company, layoffs of 225 employees and the naming of two new executive vice-presidents, National Advanced Systems (NAS) was blamed by its parent National Semiconductor Corp. for much of the $30.5 million quarterly loss reported last week.

Ironically for National Semiconductor, its NAS mainframe business has soured just as its formerly slump-ridden semiconductor business has rebounded handsomely.

NAS has been having trouble keeping up with orders on its new direct-access storage device peripherals, but its mainframe sales have been sluggish.

The company said it hopes mainframe orders will be boosted with last week's announcement of a new series of mainframe computers with 15 models, called the AS/EXTM (see story page 128).

"Mainframe orders in June and July were very weak," NAS spokesman Chuck Mulloy said.

The company would not quantify the lack of orders, but Mulloy said they had picked up slightly in late August.

Laying the blame

Mulloy blamed the slowdown in orders on speculations about IBM's S series mainframe, announced last month, and post-announcement analysis of IBM's complex pricing structure involving upgrades.

Last week's announcement was not a surprise to analysts. Bonnie Digrius, an analyst at Santa Clara, Calif.-based Infocorp, blamed NAS' recent troubles on the company's lack of marketing savvy.

"They need to get out there and market. They have some interesting things to say, but they're quiet about them," Digrius said.

Paying dearly

NAS restructuring charges accounted for $16.6 million of the $30.5 million, or 31 cents-per-share National Semiconductor loss in the first quarter ended Aug. 28.

In the year-earlier quarter, the firm posted a profit of $13.5 million, or 10 cents per share.

Revenue enjoyed a solid 25% increase to $649.4 million, compared with $517.6 million a year earlier.

National Semiconductor President Charles Sporck said in a statement that semiconductor operations had strong demand and modest growth in the quarter.

MSI resists predator Telxon

BY STEPHEN JONES
CW STAFF

AKRON, Ohio — Telxon Corp. is trying to gobble up its biggest competitor in the handheld computer business, but the acquisition target, MSI Data Corp., wants no part of what it views as a shotgun marriage.

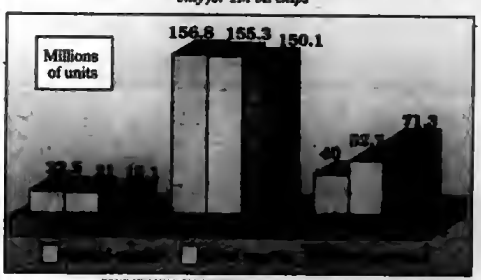
Telxon, based here, made an unsolicited proposal of $17 per share for MSI last week, characterizing the offer as negotiable and not hostile. But executives at MSI in Costa Mesa, Calif., balked at the bid of nearly $90 million and sent a statement to shareholders warning them not

Continued on page 104

Data View

Big chips to the rescue

Projected Japanese DRAM chip production for 1988 shows growth only for 1M-bit chips



SOURCE: JAPANESE MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY
CW CHART

DEC triumphs in settlement

BY NELL MARGOLIS
CW STAFF

MAYNARD, Mass. — Last week's settlement of Digital Equipment Corp.'s 5-month-old patent, copyright and trademark infringement lawsuit against third-party memory board manufacturer Clearpoint Research Corp. was declared "a good settlement for us" by spokesmen for both companies. The known terms of the sealed settlement, however, looked like an all-counts win for DEC.

According to a joint statement issued by the former litigants, the following will occur: The lawsuit will be dismissed; Hopkinton, Mass.-based Clearpoint will withdraw its VBI RAM board product from the market; Clearpoint will institute a renaming system that will eliminate all marks similar to DEC's; and Clearpoint will pay an unspecified sum to DEC as compensation for the infringement of DEC's intellectual property rights.

"This is an implicit acknowledgement of the infringement of our intellectual property rights," said DEC spokesman

Continued on page 105

Novell buying spree stays on course

BY PATRICIA KEEFE
CW STAFF

PROVO, Utah — Continuing its strategy to buy pieces of the IBM connectivity puzzle, Novell, Inc. recently purchased a 60% stake in Indisy Software, Inc., a developer of network-to-IBM host store-and-forward software.

The two vendors will work to integrate Novell's Message Handling Service (MHS) into Indisy's communications software. MHS facilitates internetwork, intranetwork and remote personal computer messaging.

Whereas Novell previously focused on supporting a variety of network environments via desktop computer-based communications, Los Angeles-based Indisy provides more of a host-oriented approach to micro-to-mainframe connectivity.

Specifically, Indisy uses the mainframe to distribute information between multiple users on any IBM Netbios-based network. "It's sort of like MHS on a mainframe," said Craig Burton, Novell's vice-president of corporate development.

"It will really open up the entire corporate enterprise to Novell now," claimed John Grant, Indisy's vice-president of marketing.

Novell has developed a pattern of buying or developing alliances with small firms — typically with 20 employees or fewer — that are capable of supplying specific pieces of IBM's mainframe communications strategy (see list).

Indisy will retain its sales office in Los Angeles and its research and development facilities in Toronto. Indisy was formerly a division of Crowntek, the Canadian holding company that recently divested mainframe database software developer Computer Corporation of America (CCA) via a leveraged buyout by CCA management.

In Indisy's case, Novell gets access to IBM hosts running MVS/CICS and TSO systems and to non-IBM mainframes run-

Continued on page 107

Acquisitions, alliances

- **Indisy Software, Inc.** in Los Angeles, Calif., a developer of host-oriented store-and-forward information messaging software for enterprisewide networks. Novell owns 60%.
- **Santa Clara Systems, Inc.** (SCS) in Santa Clara, Calif., a workstation supplier that helped Novell design a diskless network computer. Novell bought SCS in February 1987.
- **Softcraft, Inc.** in Austin, Texas, a developer of SQL-like development tools, which is helping Novell build an SQL server. Novell bought Softcraft in November 1986.
- **CXI, Inc.** in Mountain View, Calif., a maker of micro-to-mainframe boards and gateway software for the IBM Systems Network Architecture market. Novell bought CXI in January 1987.
- **Phaser Systems, Inc.** in San Francisco, Calif., a developer of micro-to-mainframe links and programming tools. The firm is privately owned 100% by Novell President Raymond Noorda. Phaser unveiled PSAM/LAN, a mainframe connectivity system for Novell Netware users, in March.

MSI resists

FROM PAGE 103

to act on the Telxon offer until MSI's board of directors evaluates the deal through due diligence.

"It's a hostile tender," said Ed Johnson, director of human resources at MSI. "We're not looking to be part of anyone else, and they're our chief competitor."

If the companies were to merge, it would not be the happiest of pairings. The two have been waging war with each other in the portable bar-code-reader business for several years.

Telxon, the market leader with $124 million in sales for its last fiscal year, sued MSI three years ago for using proprietary Telxon information. The suit, which calls for $100 million in punitive damages, has yet to go to trial, a Telxon representative said.

MSI countered with its own lawsuit, accusing Telxon of infringing on its patents for bar-code readers that can be hooked into mainframe computers.

The bad blood between the companies led analysts to voice surprise over the merger proposal. "These aren't people you would expect to get along real well if you put them in the same room together," said Robert Johnson, a research analyst at Rotan Mosle, Inc. in Houston.

Johnson said MSI became ripe for a merger after two years of flat earnings and revenue. MSI, which had revenue of $90 million in its last fiscal year, saw its stock dip slightly below its $9 book value last month after announcing that earnings for its second fiscal quarter ended Sept. 30 would be about half the amount posted for the same period last year.

The stock jumped to $17 on news of the proposed buyout, which would see Telxon snare a majority of MSI's shares.

While the takeover bid could be viewed as hostile, Johnson said MSI could benefit from teaming up with a strong partner. For its purposes, Telxon would get its hands on MSI's lucrative European business, a market in which Telxon has had lackluster results.

MSI's board of directors will notify the company's stockholders of its position on the offer by the end of this week. Telxon's offer expires Oct. 7.

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IN BRIEF

Altos sees shortfall

Altos Computer Systems became the latest in a series of vendors to warn of poor performance in the current quarter. The San Jose, Calif., multiuser microcomputer manufacturer said it will report an operating loss and a decline in sales compared with the year-earlier period. For explanation, Altos cited a slowdown in U.S. market channels as well as the traditionally slow summer selling season overseas.

Slow CASE sales

The third-quarter slowdown may be affecting the computer-aided software engineering (CASE) market as well. Cambridge, Mass.-based Index Technology Corp. said sales in the quarter ending Sept. 30 will be below analysts' expectations and below the second-quarter total of $7.5 million.

Interest in Zenith

Zenith Electronics Corp., parent of Zenith Data Systems, moved closer to a possible sale. Brookhurst Partners Limited Partnership, the New York investment group that has acquired a 6.1% stake in Zenith, filed a lawsuit seeking to oust Zenith board members. The group reportedly wants to buy Zenith, sell the loss-plagued television business and retain the profitable computer division.

Interlan for sale?

Micom Systems, Inc.'s Interlan subsidiary is reportedly on the verge of being acquired. Among the prime contenders, say financial analysts, are Network Systems Corp. of Minneapolis and London-based Racal-Milgo.

Meanwhile, Micom and its parent company, New York-based Odyssey Partners, have to contend with a shareholder suit. Two shareholders filed a lawsuit last month protesting the sale.

Unhappy camper

There is no joy in Beaverton, Ore. Floating Point Systems, Inc. announced that third-quarter revenue was down 6% to $17.1 million. The company also announced a loss of $3.5 million, compared with a loss of $12.3 million for last year's similar quarter.

Irwin for PS/2?

Irwin Magnetics, Inc. in Ann Arbor, Mich., said last week that IBM had decided to use Irwin's minicartridge tape backup systems for IBM's Personal System/2 line. Irwin, a $49 million firm, claims to have shipped 600,000 tape back-up systems since its founding in 1983.

Off the table

NBI, Inc.'s on-again, off-again effort to find a buyer is abandoned. New NBI President Stephen Jerritts said he will attempt to turn around the troubled office products maker. NBI told investment adviser Hambrecht & Quist, Inc. to halt efforts to find a buyer.

Stock buy-back

Lotus Development Corp. announced a stock repurchase plan in which it will buy back up to 15% or 6.7 million of its outstanding shares. Lotus, whose stock has traded at yearly lows recently, was posting $186 million in cash on its balance sheet as of July 2.

FTC OKs Gould buy

The acquisition of Gould, Inc. by Nippon Mining Co. Ltd. received lightning-quick antitrust clearance last week from the Federal Trade Commission under the Hart-Scott-Rodino Act. The transcontinental merger still faces Department of Defense approval of a plan for Gould to retain indirect ownership of its defense-related businesses.

Cullinet abroad

With an eye on the coming of the open Common Market in Europe in 1992, Cullinet Software, Inc. last week announced a formal three-part European regional structure and the appointment of key executives to oversee two of the three new company divisions. Former European headquarters area business director Robin Dahlberg takes over as vice-president and general manager of the Northern Europe, Middle East and Africa region, and Jan Picavet moves up from managing director of Cullinet Software SA in Belgium to vice-president and general manager of the Southern Europe region.

Not too bothered

San Jose, Calif.-based Convergent, Inc. and Unisys Corp. are going full steam ahead with their plans to converge and unify, undeterred by a class action suit filed in Delaware state court last week challenging the proposed merger. The plaintiffs want the merger blocked or, if consummated, set aside on the grounds of inadequate price. Both companies dismiss the suit as "completely without merit."

Facts for Sage, Forot

Shortly after announcing a marketing pair-up, Sage Software, Inc. and H. Ross Perot's Perot Systems Corp. announced their first contract — a $250,000 pact to implement Sage's CASE products at the Los Alamos National Laboratory and the University of California.

DEC triumphs

FROM PAGE 103

Jeffry Gibson.

Clearpoint Executive Vice-President John Stadler conceded that the settlement looked like an out-of-court DEC victory; however, he said, "looks like" are the operative words. Cancellation of the VBI RAM board, Stadler said, will loom less than large in his company's future. "This is a product in the late stages of its life cycle," he said. "It accounts for maybe .1% of our [current] sales."

About the renaming system, Stadler said customers identify Clearpoint products by description rather than by technical name. He also said that the terms of the settlement prohibited discussion of the compensation payment to DEC.

Clearpoint, which could see about 170% growth by the end of its current fiscal year and is still very committed to the DEC marketplace, is contemplating an initial public offering, Stadler said. The chance to issue a prospectus that does not have to refer to ongoing litigation with DEC, Stadler implied, is not an insignificant advantage of the settlement.

DEC received further glad tidings on the legal front last week in the form of a U.S. General Services Administration Board of Appeals opinion entitling DEC and Wang Laboratories, Inc. to recover an as-yet-undetermined portion of the $1 million-plus total in legal costs sought by the two Massachusetts companies in connection with their 1987 challenge to the U.S. Air Force's contracting procedures.

DEC and Wang charged the Air Force with bid rigging, principally on the grounds that a hotly sought 20,000 minicomputer contract worth about $4.5 billion required that the successful bidder's computers run Unix.

Last fall, the GSA board ruled for the Air Force, finding that Unix was an industry standard. However, the ruling also said that the Air Force should have been more specific in certain terms that would determine contract compliance.

When the Air Force filed an amended contract solicitation, DEC and Wang claimed a partial victory. Last week, the board agreed, paving the way to partial reimbursement.

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5 The contest is open to residents of the continental U.S. and Canada, 18 years of age and older, except employees of International Data Group, its agents, affiliates and subsidiaries. This offer is void where prohibited, and subject to all federal, state and local laws.

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Japan-U.S. trade tiff goes on

Despite Hawaii meetings, differences remain on key patent system issues

BY LORI VALIGRA
IDG NEWS SERVICE

TOKYO — Recent bilateral meetings between Japan and the U.S. in Hawaii accomplished little more than the two nations agreeing that they have disagreements.

At least one major issue — value-added network (VAN) standards — left the two sides at opposite extremes. Japan wants international VANs to adhere to the International Telecommunications Union protocol, while the U.S. wants Japan to also accept its VANs, which use a variety of unique protocols. According to press reports here, each side is adamant in its view.

The Hawaii meetings were an opportunity for each to explain its views on patents, semiconductor trade, VANs and other issues. "First we have to at least point out the concerns of each side," explained Shin Yasunode, deputy director of Japan's Ministry of International Trade and Industry's (MITI) American Oceania Division, which was involved in the talks. "Comprehensive discussions between Japan and the U.S. will be useful, for example, for us to explain the Japanese patent system."

There are ongoing international efforts under way to harmonize patent procedures, especially among major markets such as Europe, Japan and the U.S. Europe and Japan use first-to-file rules to grant patents; the U.S. grants patents based on innovation.

Problems in the disparity between the two systems came to center stage here recently when a U.S. lighting company charged a Japanese company with patent infringement of one of its products. The Japanese company had, however, filed for the patent first in Japan.

> "I KNOW there are a lot of criticisms of the Japanese patent system, such as the delays. But we have problems with the U.S. patent system."
>
> SHIN YASUNODE
> MITI

There have been several past instances of U.S. companies complaining that Japanese firms make minor changes to U.S. products, file first for patents and win them.

Timing at issue

At the core of the problem is the time it takes to get a patent approved in Japan — an average of five years.

Meanwhile, about 1½ years after the initial application, all patent applications are made public. In the U.S., a patent application is made public only if and when it is approved.

"I know there are a lot of criticisms of the Japanese patent system, such as the delays," Yasunode said. "But we have problems with the U.S. patent system."

Leading his complaints is that when U.S. patent law is applied to patents of foreign origin, it uses the first-to-file basis instead of first-to-innovate. "So even when a Japanese application was innovated two years ago, if it is filed today, that is when the U.S. patent office recognizes it, not two years ago. This is a discriminatory process," he said.

Semi tough?

The semiconductor discussions ran similarly. Satoshi Mizuno, director general of MITI, explained to Assistant U.S. Trade Representative Donald Phillips the efforts made by the Japanese government and semiconductor companies to expand imports of U.S. chips.

"There were no agreements on what should be done to lift or suspend the semiconductor sanctions," Mizuno said.

The U.S. representatives did, however, say they will not lift punitive sanctions on certain Japanese goods because the market share of U.S. chips is not high enough. The U.S. has been asking for a 20% market share in Japan.

Before the meetings, U.S. computer makers and users had asked the U.S. government to alter the semiconductor agreement between the two countries. "They claimed that because of the semiconductor agreement, prices have risen very sharply," Yasunode said. "They did not say what exactly they want changed."

Market share is key

He added that market share remains the key issue. "We [MITI] do not think we can manage the Japanese semiconductor market. If there are barriers, we would like to take them away. But beyond that, it's hard to ensure market share. That's up to the Japanese customers and the U.S. exporters," he said.

Yasunode added that some U.S. companies producing chips in Japan export 70% of their products, primarily memory chips, to the U.S. "If they sold those products in Japan, they could increase the market share here. This could make a big difference. There are shortages of chips here and in the U.S.," he said.

Despite the lack of apparent progress during the negotiations, Yasunode is optimistic about future bilateral discussions. "Relations between Japan and the U.S. aren't better, but they're not worse. We seldom make agreements at this type of meeting."

NICKELS & DIMES

Computer Consoles, Inc. announced revenue of $42.7 million for the second quarter ended June 30, compared with $35.8 million in the previous year. Profits were $3.1 million, or 23 cents per share, a 250% increase over the $885,000, or 7 cents per share, reported in the second quarter last year.

Fibronics International, Inc. announced revenue for the second quarter ended June 30 of $10.4 million, compared with $8.7 million in the previous year. Net income was $353,000, or 6 cents per share, compared with a net loss of $660,000, or 11 cents per share, in the like period a year ago.

American Software, Inc. reported revenue for the first quarter ended July 31 of $15.3 million, compared with $11.2 million last year. Profits were $3.9 million, or 38 cents per share, compared with $1.3 million, or 12 cents per share, in the comparable period a year ago.

The Meridian Group announced a 158% increase to $12.9 million in fiscal year 1988, which ended June 30. The company reported fiscal 1988 revenue of $288 million, a 106% increase over fiscal year 1987, and pretax earnings of $16.3 million, a 46% increase over the prior year. Also, total assets exceeded $520 million, up from $250 million and a 108% increase.

Capital Associates, Inc. announced revenue for the year ended May 31 of $104.9 million, compared with $56.5 million reported in the previous year. Profits were $8.8 million, or 94 cents per share, compared with $10.2 million, or $1.25 per share, in the previous year.

For the fourth quarter, revenue was $37.1 million, compared with $18.2 million last year. Profits were $3.2 million, or 34 cents per share, compared with $2.6 million, or 27 cents per share, in the comparable period last year.

LDI Corp. reported $56 million in revenue for the second quarter ended July 31, compared with $34.1 million last year. Profits were $1.5 million, or 33 cents per share; compared with $981,000, or 25 cents per share, in the like period a year ago.

Everex Systems, Inc. announced revenue for the year ended July 31 of $266.7 million, compared with $157.5 million in the previous year. Profits were $10.5 million, or 45 cents per share, compared with $8.6 million, or 51 cents per share, last year.

For the fourth quarter, revenue was $78.9 million, compared with $48.6 million a year ago. Profits were $2.9 million, or 13 cents per share, compared with $2.7 million or 14 cents per share, in the previous year.

Warner Computer Systems, Inc. reported revenue for the third quarter ended July 31 of $5.6 million, compared with $5.3 million last year. Profits were $218,000, or 4 cents per share, compared with $622,000, or 10 cents per share, in the like quarter last year.

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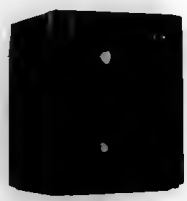

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Buying spree

CONTINUED FROM PAGE 103

ning IBM's Distributed Office Support System (Disoss) or Systems Network Architecture Distribution Services (SNADS) interfaces. "This isn't something that users have been pushing us for, but it's an important piece of [technology]," Burton said.

Using Indisy software, two PCs could use a mainframe to route messages back and forth between remote networks. Alternately, a network node could send data through a mainframe to an attached dumb terminal.

Users reportedly can do all of this — as well as other mainframe-type functions now relegated to IBM 3270-type devices — without exiting their applications, Grant claimed.

The type of information supported by Indisy's product family includes word processing, electronic messaging, spreadsheets, data files, software programs and a variety of reports.

The investment in Indisy could elevate the visibility of Novell's CXI, Inc. subsidiary, a provider of micro-to-mainframe links that has been relatively quiet under Novell's wing.

At first glance, it could appear that Indisy and CXI are competitive. In fact, they are not, Burton said.

CXI builds communications server- and terminal-emulation products for networks and stand-alone workstations. Its products provide file transfer and IBM 3270 emulation from a PC to a host. Conversely, Indisy is more comparable to SNADS, Burton said.

Indisy will use CXI's engine and SNA protocols, Burton said. "How does a PC communicate with a host? It has to use SNA protocols, which Indisy doesn't build," he said. Until now, Indisy has been getting that technology from other third parties.

In addition, it is unclear what impact the partnership between Novell, its CXI division and Indisy will have on Softswitch, Inc.'s leadership position in the Novell Netware market, in which it supplies gateways between Netware and other environments from such large vendors as IBM and Hewlett-Packard Co.

Softswitch allows users to send electronic messages — be they text or graphical images — between dissimilar systems. It is also an MHS licensee.

"Functionalitywise there is some crossover, but I see it as complementary rather than competitive," Burton said.

But Indisy's Grant said Indisy has a big advantage over Softswitch. He claimed Softswitch merely provides the glue between many pieces in an enterprisewide network, forcing users to buy pieces such as mainframe communications and electronic mail separately, while Indisy provides all that in one package.

That $275,000 package will support about 100 local-area networks. The system includes software for the host system and for one PC on each network.

Wilder

CONTINUED FROM PAGE 103

chose a San Francisco courtroom for its unexpected salvo of look-and-feel allegations against Microsoft and Hewlett-Packard. Although Apple has not prowled around enlisting fellow vendors for its cause, its user interface lawsuit also draws battle lines in the PC market.

What makes the choose-up-sides trend of 1988 particularly worrisome is the Holy Grail that all these combatants covet: the Industry Standard. The contentious clone makers last week went so far as to take the hallowed words for their own in labeling the forthcoming Extended Industry Standard Architecture.

I always thought industry standards evolved from marketplace demands (thus the term de facto — not de jure) rather than vendor decrees. Silly me. An MIS director's worry list is already getting longer by the day, what with applications backlogs, programmer productivity, mainframe upgrades. Now the vendors are choosing sides on standards, throwing even more confusion into an already cloudy future.

And the worst part of it is that they're claiming it's all for the good of the user. Give me a break! Tell your shareholders you're trying to lock out (or sue) your competitors to increase your market share and profits — but please don't tell your customers you're gung ho for openness and standards that will provide them all with interconnectivity nirvana.

During the past two to three years, MIS customers have wistfully wished that their suppliers could get together on ways to help them solve the multivendor communications muddle. But in 1988, the proliferation of battling vendor alliances has turned Industry Standard into a dreaded phrase. This is also the year that one firm, Synoptics Communications, got into trouble in its initial public offering by making what some IEEE members charged were false claims to networking industry standards [CW, Aug. 22].

It's not an easy time for MIS to make major strategic decisions on Unix or microcomputers. What to do? Be patient, stay on the sidelines and hope that there is soon some significant hatchet-burying, as OSF and the AT&T-Sun alliance have hinted. And beware of vendors bearing "standards that are better than the other guys' standards."

Wilder is *Computerworld*'s senior editor, computer industry.

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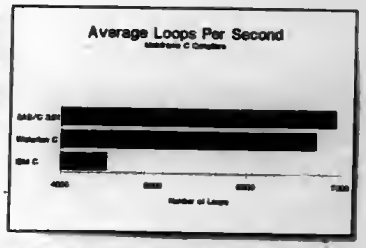

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Some rumblings in the oil field

Economic upswing promises more opportunities, but it's still no gusher

BY JANET MASON
SPECIAL TO CW

For most MIS professionals, the oil patch has been low on the list of places to seek opportunities. But with an industry upswing and increasing reliance on computers, massive layoffs are giving way to limited hiring.

In the wake of a devastating flood of layoffs beginning in the early 1980s, oil companies have stepped up MIS hiring during the past year, according to recruiters. At the same time, salary caps have been lifted, and pay is described as more competitive with other industries.

Although the oil business has been depressed, companies have not allowed their data processing centers to become outdated, according to Greg Bumgarner, recruiter at the Dallas office of Source EDP. "Oil companies have kept their DP shops in top condition," he says. "Now they are looking for people with top-notch skills."

Hiring increases steadily

To keep costs down, many oil concerns have been using contract employees to handle extra work. But in the past year, there has been a steady increase in the demand for permanent MIS employees, says Maureen Davidson, manager of DP recruiting at the Houston office of Robert Half International, Inc.

Davidson says she has had to recruit from other parts of the country. "Many good technical people left Houston during the downturn," she explains. "Now, even though there are some good technical people left here, we have to recruit from other areas to meet the MIS needs of companies."

Reactions to the downturn in the oil market varied widely. "Even during the downswing, we did not have much reduction in people," says an MIS human resources manager at Houston-based Shell Oil Co., who requests anonymity.

Shell's employment has remained stable during the recent upturn as well. The MIS division hires to compensate for its attrition of about 6% a year, mostly on campuses, but it has not been recruiting aggressively.

On the other hand, Sun Co. in Radnor, Pa., put a salary cap on all departments at the beginning of the downturn and hit MIS particularly hard with layoffs, says Edward Parrish, director of information systems, technology and planning at the company. "In 1983 we had about 1,100 MIS employees and now we have about 525," he says. He attributes the decimation to top management's not fully understanding the importance of MIS.

But Sun is not rushing to staff up. For the past year or so, MIS employment has been stable, although salaries are now competitive with the rest of the industry, Parrish says.

Like Shell, Sun has a policy of promoting from within and recruiting at colleges for entry-level positions. Parrish says the company has hired few or no senior MIS people during the past three or four years.

> "OIL COMPANIES have kept their DP shops in top condition. Now they are looking for people with top-notch skills."
>
> GREG BUMGARNER
> SOURCE EDP

Once burned . . .

Despite the cautious posture, recruiters maintain that there is opportunity for MIS employees. "I have offers for $50,000 project leaders and $30,000 programmers," Source EDP's Bumgarner says. Still, he adds, some MIS people are reluctant to enter the oil industry, particularly ones who worked in it before and were laid off.

All of the oil patch is not in an upswing. "Houston is the best area, then Dallas," Bumgarner says. "Tulsa and New Orleans are still in a slump, but there are some positive signs."

In Houston, Davidson finds oil-industry MIS salaries competitive with levels in other industries and sometimes higher, depending on the technical skills required. "Salaries can range from $35,000 to $40,000 for a programmer/analyst and from $38,000 to $45,000 and possibly higher for project leaders," she says.

Database specialists are in demand. In addition, skills in telecommunications, personal computers and local-area networks are highly marketable.

One new application for such technologies is the point-of-sale system for gasoline stations. It transmits data from the pumps and a customer's credit card to a central facility where the data is processed for billing.

Oil companies use computers heavily in their engineering and scientific departments, but generally there is little overlap with MIS, according to Bumgarner. "MIS and engineering systems are totally different areas, and MIS candidates are not expected to know anything about engineering systems," he says.

But there is interplay at some companies such as Shell, where about three-quarters of the computer systems staff is in MIS and the rest is in the scientific area. "Typically, the scientific and engineering people stay within their disciplines, but there is some movement between skill areas," the Shell manager says.

Communication's role

In addition to technical skills, interpersonal communication is playing an ever-important role. "We're transferring more technology to the end user, so it's more important for the MIS person to be able to explain the technology," Sun's Parrish says.

At Sun, MIS people work with business units rather than as a separate division. The company has taken some senior MIS people and removed them from their jobs for several years, placing them in functions such as planning and strategy so that they can learn the business.

The major challenge is to apply existing technology to business problems, Parrish says. "This is the petroleum industry," he notes. "MIS employees have to find out how the industry works — who buys crude oil and how the finished product is sold."

Mason is a Philadelphia-based freelance journalist.

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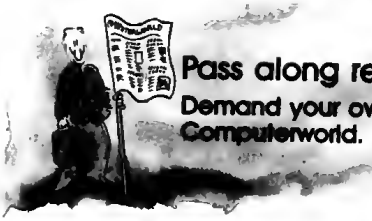

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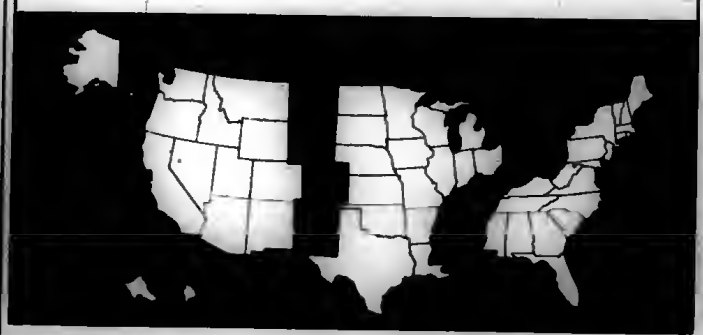

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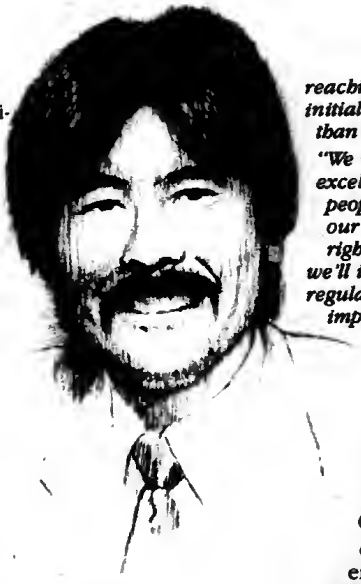

Cesar Namba is Assistant Vice President for MIS Recruitment at Imperial Corporation of America (ICA) in San Diego, California. ICA is a financial services organization that has savings and mortgage institutions in 20 states.

For Cesar, filling important MIS/DP positions is the name of the game. Recently, ICA embarked upon a change in part of its corporate technology, and that meant that Cesar had to go to work finding qualified personnel. And for reaching the best possible candidates, he turned to *Computerworld.*

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Baxter provides excellent compensation and benefits including relocation assistance, tuition reimbursement, credit union, retirement plans, and more. For consideration, send resume in confidence to: **Elaine Kirchner/Dept. CW, Healthcare Systems Division, Baxter Healthcare Corporation, 587 E. Sanlando Springs Drive, Longwood, FL 32750.** Equal Opportunity Employer

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- A minimum of 2 years in systems analysis and design using structured methodology
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- Bachelor's degree in Computer Science, Information Systems, or Business Administration

For confidential consideration, please send resume with salary requirements to: **Corporate Headquarters/Employment, Dept. DK-9/19, The Coca-Cola Company, P.O. Drawer 1734, Atlanta, GA 30301.** An Equal Opportunity Employer.

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data processing

Programmer/ Analyst

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CAREER INDEX

July 1988 computer recruitment advertising activity*

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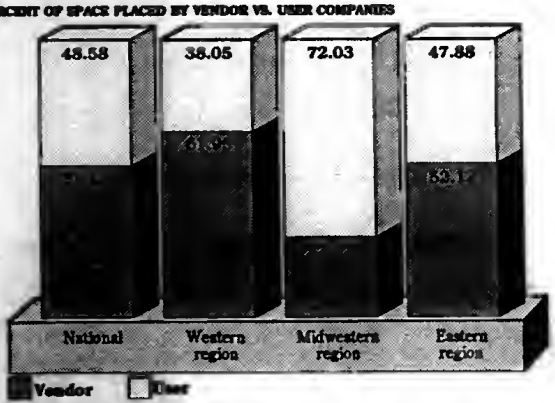

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MARKETPLACE

AS/400 to keep market liquid

Upgrades are expected to pump up supply and demand for System/36, 38

BY ALAN RADDING
SPECIAL TO CW

The introduction of IBM's Application System/400 as an upgrade path for mid-range users is likely to enlarge the supply of used System/36 and 38 equipment, but demand should remain strong, according to market participants.

Thus far, however, the new line has had limited impact. Brokers report the supply of used System/38 machines to be up marginally, with corresponding downward pressure on prices. But the major impact is expected further down the road.

The long-awaited announcement of the AS/400 in June has set the stage for movement in the used market. "It lifts the freeze on customer decision-making," says Dick Daniels, a vice-president at Memphis-based Econocom-USA, Inc., a major buyer and seller of used System/36 and 38 products.

As the AS/400 introduction drew near, Daniels says he noticed that activity in the used market dwindled while users waited for details of the new machine. Now that the AS/400 is here, activity is resuming. "I see signs that the business is coming back, strong as ever," he says.

But the real impact of the AS/400 is expected months and even years from now as System/36 and 38 users upgrade.

Watching and waiting

"Certain people rushed in orders [for the AS/400] the first day, but the majority of users are sitting out trying to figure out what it all means," says David Andrews, president of consulting firm ADM, Inc. in Cheshire, Conn. As that majority begins to upgrade to the AS/400, Andrews says he expects to see greater supply and demand in the used market. "There hasn't been a huge uptick in the used market yet, but there will be eventually," he says.

It is already clear that the AS/400 will affect the markets for used System/36s and 38s differently. In addition to a more difficult migration, System/36 users are more likely to take alternative paths such as turning to the used market for a larger System/36 or a System/38.

There has always been a larger, very active market for used System/36s. While some System/36 users will upgrade to the AS/400 soon, market analysts expect the large market for the used machines to continue to flourish as users upgrade them.

"In the short term, I think people will upgrade their System/36s. They'll add pieces from the used market," says John Crilly, chief executive officer of Sun Data, Inc. in Atlanta, another major buyer and seller of used mid-range systems.

Companies that have a high-end System/36 face the most difficult choice, Daniels says. "They can go for a 38 at a bargain or bypass the 38 and go straight to the AS/400," he says.

Because the user base for the System/38 is much smaller than for the 36, there have always been fewer System/38 machines on the used market.

Crilly says he expects many System/38 users eventually will go with the new line. "It is too easy to replace a 38 with the AS/400," he says.

ADM's Andrews says he expects to see the AS/400 impact the used System/38 market before it does the System/36 market. "We'll start to see more 38s on the used market later this year," he says.

> "CERTAIN people rushed in orders [for the AS/400] the first day, but the majority of users are sitting out trying to figure out what it all means."
>
> DAVID ANDREWS
> ADM

Brokers such as Econocom report a good supply of System/38s, which has increased slightly in recent weeks. There has been a corresponding decline in prices, as well. But Daniels says not to expect the bottom to fall out of the market.

Andrews says some System/38 users will opt to upgrade those systems rather than jump to the AS/400, helping mop up the increased supply of used System/38s. "It might be easier and simpler to buy a used 38 than switch to the AS/400," he says.

Price/performance edge

Sellers of used IBM mid-range systems say they traditionally have tried to maintain at least a 40% price/performance edge over new models. Crilly reports that used System/36s are selling at a 40% discount but that System/38s are being discounted by as much as 60%.

Analysts do not expect radical shifts in the used IBM mid-range market. Eventually, IBM is expected to discontinue the products and support, but third-party vendors are prepared to fill the void, Daniels says. The older IBM mid-range systems are "not going to be dumped in the Hudson River," Andrews says.

As an example of the longevity he expects, Andrews cites the thousands of System/34s still in use. Analysts expect the System/36 and 38 to fade away only very slowly.

Radding is a Boston-based author specializing in business and technology.

PC Products

The BoCoEx index on used computers

Closing prices report for the week ending Sept. 9, 1988

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PS/2 Model 80	$2,350	$2,900	$1,900
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Plus	$1,100	$1,100	$900
Deskpro 86-Mhz	$1,200	$1,450	$975
Deskpro 286	$2,975	$3,150	$3,000
Deskpro 386	$5,100	$6,100	$4,600
Apple Macintosh $12	$725	$900	$595
$12E	$800	$925	$650
Plus	$1,050	$1,125	$850
Plus 20-Mhz	$1,400	$1,450	$1,300
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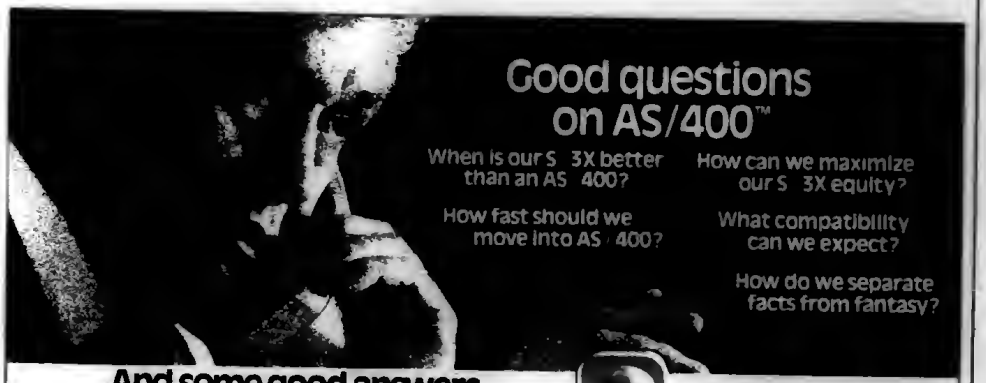

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IBM

SYSTEMS	MIPS (Millions of Instructions Processed Per Second)	MEGABYTES
9373-30	0.3	4 to 16
9375-40	0.3	8 to 16
4331-2	0.80	1 to 4
9_38-300	0.98	8 to 8
9_38-400	0.75	8 to 8
9375-60	0.78	8 to 16
4341-1	0.88	8 to 8
9_38-600	0.98	8 to 16
5_38-730	1.1	16 to 32
4381-11	1.4	4 to 16
4381-5	1.45	8 to 16
4341-2	1.5	2 to 16
9377-80	1.6	8 to 16
4341-12	1.65	8 to 16
14381-21	2.1	8 to 16
4381-1	2.1	4 to 16
4381-2	2.7	4 to 32
4381-12	2.7	8 to 32
14381-22	3.1	16 to 32
4381-13	3.6	8 to 32
3083EX	4.4	8 to 32
4381-3	4.5	8 to 32
14382-23	4.7	16 to 32

SYSTEMS	MIPS	MEGABYTES
*4381-91E	4.7	16 to 64
3033UP	5.0	4 to 24
4381-14	5.0	16 to 32
3083EX	5.0	8 to 32
43090-1_0E	5.5	8 to 32
14381-24	5.5	16 to 64
*4381-92E	7.0	16 to 64
3083JK	7.0	8 to 64
3090-_20	7.0	16 to 64
3083JX	7.0	16 to 32
3090-_0E	7.0	32 to 64
3081D	11.0	32 to 64
3090-_0E	11.0	16 to 64
3090-_0E	15.4	32 to 64
3090-_0E	18.5	16 to 64
3090-_0E	18.5	32 to 64
3090-200	31.0	32 to 128
3090-400E	56.0	128 to 256
3090-300E	67.0	128 to 256
3090-600E	76.0	128 to 256

*1st Installation 11/88
‡1st Installation 3Q/88
†1st Installation 1Q/89

NATIONAL ADVANCED SYSTEMS

SYSTEMS	MIPS	MEGABYTES
AS/VL-50	7.5	32 to 128
AS/VL-60	10.0	32 to 128
AS/6000	11.0	16 to 64
ASXL-50	15.0	32 to 64
AS/6070	16.0	16 to 64
AS/VL-80	17.1	32 to 256
AS/6000	20.0	16 to 64
ASXL-60	26.0	64 to 256
ASXL-80	35.0	64 to 256
ASXL-90	67.0	128 to 512
ASXL-100	80.0	128 to 512

The above information is intended as a guideline for computer users on relative computer systems instruction cycle times. All data have been derived from published documentation and represent reasonable estimates of average MIPS ratings. However,

Randolph is not responsible for the accuracy of the MIPS data. Cycle times will vary based on hardware/software configurations, and system manufacturers continually modify computer models as design improvements in hardware and software arise.

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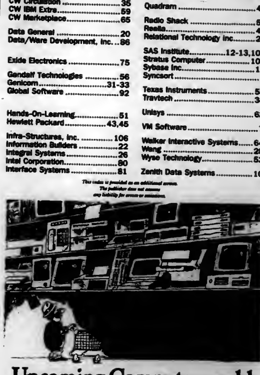

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Oct. 17	AI/Expert Systems	Sept. 30
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Nov. 14	PC Graphics	Oct. 28
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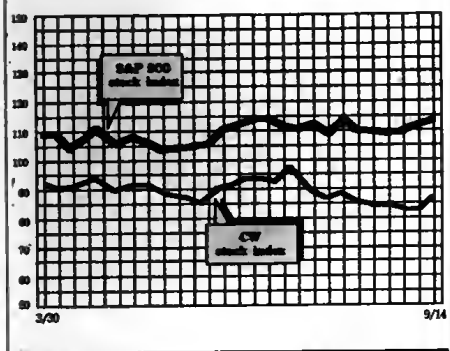


Indexes	Last Week	This Week
Communications	96.5	96.7
Computer Systems	94.5	96.3
Software & DP Services	96.7	102.2
Semiconductors	57.9	60.3
Peripherals & Subsystems	78.5	81.5
Leasing Companies	108.0	111.9
Composite Index	83.6	86.3
S&P 500 Index	112.0	113.4

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, SEPT. 14, 1988

EXCH		52-WEEK RANGE (1)		CLOSE SEPT. 14 1988	WEEK NET CHNGE	WEEK PCT CHANGE
	Communications and Network Services					
N	AMERICAN INFO TECHS CORP	100	74	92.88	0.0	0.0
Q	ANDREW CORP	19	11	16.50	0.0	1.9
Q	ARTEL COMM CORP	3	1	2.00	-0.1	-6.6
N	AT&T	38	20	35.50	0.3	1.0
Q	AVANT GARDE COMP INC	5	1	1.00	-0.3	-20.0
Q	AVANTEK INC	19	6	6.25	0.5	11.1
N	AYDIN CORP	26	16	22.13	0.0	0.0
N	BELL ATLANTIC CORP	80	61	71.13	0.0	1.8
N	BELLSOUTH CORP	44	29	40.38	-0.1	-0.3
Q	COMPRESSION LABS INC	6	2	3.13	-0.1	-3.8
Q	COMPUTER NETWORK TECH	9	1	1.22	-0.1	-4.9
Q	CONTEL CORP	38	23	26.50	-0.1	-0.4
Q	DATA SWITCH CORP	10	6	6.88	0.0	0.0
Q	DIGITAL COMM ASSOC	46	20	31.38	-0.3	-1.2
Q	DYNATECH CORP	30	14	20.50	-1.0	-4.7
Q	FIBRONICS INTERNATIONAL INC	6	3	3.38	0.0	0.0
Q	GANDALF TECHNOLOGIES	6	6	6.38	0.0	0.0
Q	GENERAL DATACOMM INDS	9	3	3.63	0.1	3.5
N	GTE CORP	44	29	42.00	0.5	0.5
Q	INFOTRON SYS CORP	14	6	11.00	-0.3	-2.2
N	ITT CORP	65	42	46.75	-0.4	-0.8
N	M A COM INC	19	7	10.13	0.1	1.2
Q	MCI COMMUNICATIONS CORP	19	7	18.50	0.8	4.2
Q	MICOM SYS INC	17	7	15.88	0.1	0.6
Q	NETWORK EQUIPMENT TECH INC	26	12	17.75	-0.8	-1.4
Q	NETWORK SYS CORP	13	7	8.75	0.5	6.4
N	NORTHERN TELECOM LTD	23	14	17.50	-0.1	-0.7
Q	NOVELL INC	31	13	30.38	3.5	13.1
N	NYNEX CORP	75	59	65.75	0.5	0.8
N	PACIFIC TELESIS GROUP	34	23	29.25	0.5	0.8
N	PARADYNE CORP	9	4	5.88	0.5	11.5
A	PENRIL CORP	9	1	4.13	-0.8	-9.7
N	PLESSEY PLC	29	23	25.50	-1.4	-5.1
N	SCIENTIFIC ATLANTA INC	19	6	12.00	0.1	1.1
N	SOUTHWESTERN BELL CORP	46	32	36.13	0.5	1.0
Q	3 COM CORP	28	12	18.25	0.5	6.0
N	U S WEST INC	60	43	55.25	0.1	0.2
	Computer Systems					
Q	ALLIANT COMPUTER SYS	17	4	4.50	0.0	0.0
Q	ALPHA MICROSYSTEMS	6	3	3.00	-0.3	-4.0
Q	AMDAHL COMPUTER SYS	15	8	8.00	-0.8	-8.6
A	AMDAHL CORP	28	10	18.00	0.5	2.7
Q	APOLLO COMPUTER INC	22	6	6.25	0.1	1.4
Q	APPLE COMPUTER INC	80	29	42.00	3.8	9.8
N	BOLT BERANEK & NEWMAN	29	12	15.75	0.0	0.0
N	BRITTON LEE INC	4	1	2.44	0.0	0.0
N	COMPAQ COMPUTER CORP	76	34	66.50	4.8	8.4
Q	COMPUTER AUTOMATION INC	16	4	6.00	-0.1	-2.0
A	COMPUTER CONSOLES INC	9	3	8.50	0.1	1.5
Q	CONCURRENT COMP CORP	21	11	16.50	-0.1	-0.6
Q	CONTROL DATA CORP DEL	38	18	23.00	0.4	1.7
Q	CONVERGENT TECH	6	3	6.25	0.2	3.1
Q	CONVEX COMPUTER CORP	19	6	7.38	0.8	3.5
N	CRAY RESH INC	99	47	90.13	2.8	3.2
Q	DAISY SYS CORP	12	6	8.75	0.0	0.0
N	DATA GEN CORP	37	16	16.25	1.1	6.8
N	DATAPOINT CORP	9	3	5.38	0.4	7.5
N	DIGITAL EQUIP CORP	200	92	95.63	3.4	3.7
N	FLOATING POINT SYS INC	10	3	3.13	-0.1	-3.8
N	GOULD INC	34	9	22.63	0.1	0.5
N	HARRIS CORP	41	22	28.13	-0.8	-2.8
N	HEWLETT PACKARD CO	74	28	48.50	1.4	2.9
N	HONEYWELL INC	83	49	61.63	2.4	4.0
N	IBM	182	102	114.63	2.9	2.6
Q	INFORMATION INTL INC	19	9	14.50	0.6	1.8
Q	IPL SYS INC	3	1	2.25	-0.1	-5.3
Q	MASS COMPUTER CORP	14	4	4.50	0.0	0.0
N	MATSUSHITA ELEC INDL LTD	230	103	198.00	2.0	1.0
Q	MEGADATA CORP	9	2	2.25	0.0	0.0
Q	MENTOR GRAPHICS CORP	39	14	30.75	3.5	12.9
N	NBI INC	12	3	3.00	-0.4	-11.1
N	NCR CORP	67	50	57.63	0.5	0.7
N	PRIME COMPUTER INC	28	12	12.88	0.8	2.0
Q	PYRAMID TECHNOLOGY	16	6	13.50	2.0	17.4
Q	STRATUS COMPUTER	29	16	24.00	1.1	4.9
Q	SUN MICROSYSTEM INC	44	14	36.50	2.5	7.8
Q	SYMBOLICS INC	4	1	1.13	-0.1	-10.0
Q	SEQUENT COMPUTER SYS INC	19	9	17.38	0.0	0.0
N	TANDEM COMPUTERS INC	37	12	13.88	1.6	11.0
N	TANDY CORP	57	28	42.88	1.6	4.5
N	ULTIMATE CORP	27	9	9.88	0.3	2.9
A	WANG LABS INC	47	24	32.50	1.5	4.8
	Software & DP Services					
Q	ADVANCED COMP TECH	9	1	1.88	0.8	22.8
N	AGS COMPUTERS INC	30	11	26.50	0.0	0.0
Q	AMERICAN MGMT SYS INC	20	9	13.13	0.9	7.1
Q	AMERICAN SOFTWARE INC	19	9	10.00	-0.1	-0.6
Q	BANCTEC INC	12	4	9.00	1.0	12.9
Q	ANALYSTS INTL CORP	10	4	8.63	0.0	0.0
Q	ASHTON TATE	29	13	27.25	3.0	12.4
Q	ASK COMPUTER SYS INC	19	6	13.50	0.5	3.5
Q	AUTODESK INC	34	13	28.50	3.3	12.9
N	AUTO DATA PROCESSING	53	16	35.88	1.0	2.9
Q	BOOLE & BABBAGE INC	11	6	9.50	-0.8	-8.0
N	COMPUTER ASSOC INTL INC	37	19	27.88	2.9	11.9
Q	COMPUTER HORIZONS CORP	14	7	10.25	0.5	5.1
N	COMPUTER SCIENCES CORP	73	38	48.75	1.6	2.9
N	COMPUTER TASK GROUP INC	19	9	12.75	0.3	2.0
Q	COGNOS INC	14	4	8.88	1.9	31.1
Q	COMSHARE INC	26	12	20.50	-0.8	-3.5
N	CULLINET SOFTWARE INC	14	4	6.13	0.5	8.8
Q	DUQUESNE SYS INC	22	10	18.00	1.0	5.9
Q	DATA ARCHITECTS INC	16	7	13.75	0.0	0.0
N	GENERAL MTRS (CLS E)	61	20	41.75	1.8	4.4
Q	HOGAN SYS INC	10	3	5.00	0.5	14.3
Q	INFORMIX CORP	31	6	6.75	0.5	2.9
Q	INTELLICORP INC	7	3	3.00	0.0	0.0
Q	KEANE INC	19	8	14.25	0.0	0.0
Q	LOTUS DEV CORP	40	16	16.50	2.0	11.4
Q	MANAGEMENT SCI AMER	14	6	6.25	0.1	1.5
Q	MICRO PRO INTL CORP	7	3	3.06	0.5	9.8
Q	MICROSOFT CORP	75	37	54.00	2.9	4.3
Q	MORINO ASSOCIATES INC	20	7	13	0.9	2.9
Q	NATIONAL DATA CORP	34	20	23.00	0.8	2.7
Q	ON LINE SOFTWARE INTL INC	20	4	4.50	0.4	9.1
Q	ORACLE SYS CORP	22	6	20.25	1.8	9.8
N	PANSOPHIC SYS INC	28	11	13.00	-0.1	-1.0
Q	POLICY MGMT SYS CORP	20	19	22.50	1.6	7.1
Q	PROGRAMMING & SYS INC	14	7	12.88	0.0	0.0
Q	REYNOLDS & REYNOLDS CO	34	14	20.80	2.0	10.8
Q	SEI CORP	22	10	16.00	0.3	1.9
Q	SHARED MED SYS CORP	28	15	16.63	0.0	0.0
Q	SAGE SOFTWARE INC	13	9	7.88	0.6	12.9
Q	SOFTWARE PUBG CORP	28	9	23.13	3.0	14.9
Q	STERLING SOFTWARE INC	11	6	6.63	0.0	0.0
Q	SUNGARD DATA SYS INC	30	10	19.25	1.3	8.8
Q	SYSTEMATICS INC	34	16	32.75	0.8	2.9
N	SYS. SOFT INC.	24	7	23	1.0	4.7
Q	Vist SOFTWARE INC	18	7	14.25	0.8	5.6
	Semiconductors					
N	ADV MICRO DEVICES INC	29	9	11.50	0.5	4.5
N	ANALOG DEVICES INC	20	9	12.00	0.5	2.1
Q	ANALOGIC CORP	12	9	7.38	0.0	0.0
Q	INTEL CORP	42	18	26.75	1.8	7.0
Q	LSI LOGIC CORP	19	7	12.00	0.8	6.7
N	MOTOROLA INC	74	29	42.88	1.8	4.3
N	NATL SEMICONDUCTOR	22	6	8.63	-0.4	-4.2
N	TEXAS INSTRS INC	60	36	40.25	1.5	2.9
A	WESTERN DIGITAL CORP	27	11	14.50	0.8	1.8
	Peripherals					
Q	ALLOY COMP	13	3	2.88	0.5	0.0
N	AM INTL INC	6	3	5.50	0.0	0.0
Q	AST RESH INC	31	6	10.00	0.5	5.3
Q	AUTO TROL TECH CORP	9	3	5.50	0.4	7.8
Q	BANCTEC INC	14	6	8.63	0.4	4.8
Q	CIPHER DATA PRODS INC	12	4	9.88	0.6	6.8
Q	COMMTRONICS CORP	4	2	2.75	-0.1	-4.3
A	DATAPRODUCTS CORP	24	7	10.88	0.0	0.0
A	DATARAM CORP	9	6	7.25	-0.1	-1.7
N	EASTMAN KODAK CO	71	39	44.75	1.1	2.6
Q	E M C CORP MASS	28	4	4.38	0.1	2.9
Q	EMULEX CORP	9	4	8.25	0.1	1.5
Q	EVANS & SUTHERLAND	29	14	17.25	0.0	0.0
Q	GCOT CORP	9	3	6.13	0.0	0.0
Q	INTERLEAF INC	24	10	11.00	1.0	10.0
Q	IOMEGA CORP	6	1	3.88	0.8	24.0
Q	LEE DATA CORP	6	3	3.13	0.0	0.0
Q	MAGISTOR SYS CORP	4	1	2.44	0.0	0.0
Q	MAXTOR CORP	16	6	6.88	0.0	0.0
Q	MICROPOLIS CORP	34	10	11.50	0.5	4.5
Q	MINISCRIBE CORP	17	8	8.75	0.5	2.6
N	MINNESOTA MINS & MFG CO	84	49	63.00	1.8	2.1
A	MSI DATA CORP	18	6	17.75	7.1	67.1
Q	PERSONAL COMPUTER PRODUCTS INC.	7	4	6.88	0.1	2.9
Q	PRIAM CORP	3	1	1.75	0.0	0.0
Q	PRINTRONIX INC	13	7	10.38	0.0	0.0
N	QMS INC	27	7	6.13	0.5	10.0
Q	QUANTUM CORP	16	9	12.25	0.5	2.1
N	RECOGNITION EQUIP INC	17	6	8.00	0.0	0.0
Q	REXON INC	9	4	7.75	0.1	1.8
Q	SEAGATE TECHNOLOGY	23	6	9.38	0.4	4.2
Q	STORAGE TECH CORP	4	1	2.00	-0.1	-6.9
Q	TANDON CORP	4	1	1.88	0.2	11.1
A	TEC INC	6	3	3.25	0.1	4.0
N	TEKTRONIX INC	37	21	23.00	-0.1	-0.9
Q	TELEVIDEO SYSTINC	3	1	0.88	-0.1	-6.7
N	XEROX CORP	61	50	54.75	0.3	0.5
Q	XIDEX CORP	14	6	9.00	0.0	0.0
	Leasing Companies					
N	CAPITAL ASSOCIATES INTER-NATIONAL INC	6	4	6.75	1.0	17.4
N	COMDISCO INC	27	12	31.00	0.9	4.3
Q	CONTINENTAL INFO SYS	11	4	3.88	0.0	0.0
Q	PHOENIX AMERN INC	6	3	3.00	-0.1	-4.0
Q	SELECTERM INC	6	3	4.88	0.0	0.0

EXCH: N—NEW YORK; A—AMERICAN; Q—NATIONAL; O—OVER-THE-COUNTER; 6—SPLIT

0-7-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

On the rocks

Investors take no chances; PC foes show mild losses

Caution continued to be the stock market byword last week, reflecting uncertainty as to whether any given factor, such as apparently waning U.S. economic growth, is in fact good news or bad.

Despite the revolt of nine personal computer players against IBM's dominance of the PC market, the mighty giant dropped a mere ⅛ of a point for the week to close Thursday at 113¾, while Hewlett-Packard Co., a strong member of the opposition team, closed the week down ⅛ of a point to 48.

Digital Equipment Corp., off on the French Riviera for its Decworld trade show, announced networking products and closed the week up ⅜ of a point at 95½.

Tekron Corp., in hostile pursuit of MSI Data Corp., finished at 17¾, up ½ a point, while its target closed up ¼ of a point at 17⅛ after soaring 6⅜ points when stockholders learned of the $17-per-share tender offer Sept. 9. Meanwhile, Computer Associates International, Inc.'s purchase of Applied Data Research, Inc. from Ameritech benefited both stocks — CA by 1½ points to 27⅛, Ameritech by 1⅛ to 93¼.

NELL MARGOLIS

How much?

FROM PAGE 1

inflation on building costs during a two- or three-year design and construction period.

- The $1 million or more that it costs to have enough maintenance and security personnel to keep a system on-line.
- The price of basic supplies — for instance, $325,000 for tape cartridges.
- Little things, like spending $1,000 to soften town water supplies to IBM specifications.

Offering advice to his peers, May & Speh, Inc. data center manager Terry Cieslak recalls the year and a half of preparation that went into a 1987 move into his firm's new Downers Grove, Ill., facility. "Planning. It doesn't have to be real fancy and documented, but it has to be there," he says.

There is a very big caveat for anyone comparing costs, however, and that is issued by experienced data center managers and consultants: What you pay depends on what you want and where you want it. Construction in New Jersey might be 8% cheaper than in Manhattan, while Denver might be 30% cheaper than New York.

According to Alexander H. Ralston Jr., a principal in Philadelphia design firm The Kling-Lindquist Partnership, Inc., construction costs for a computer room can be more than double those for office space.

Where are the extras? The difference between standard office fire protection systems such as sprinklers and computer room halon-based systems is about $3.30 per square foot. The electrical system for a data center designed for high reliability might cost $70 per square foot, compared with only $8 for general office space.

The cost of a data center in New Jersey can be about $160 per square foot for a building that is 30% computer room and has a moderate level of reliability. Construction costs for just the office portion may be $75 per square foot.

Some construction costs may not be obvious. Thomas Modestino, MIS director at Ocean Spray Cranberries, Inc. in Plymouth, Mass., offered some lessons from his plans to build a new data center: "We had to set aside money for what seemed like garbage things, like the cost of cutting floor tiles. It has to be done, and we had to allow $30 per cut, with about 70 cuts to be done for cabling and other purposes."

So the 45,000-square-foot data center with 8,000 square feet of computer room might cost $5.8 million, which includes $810,000 for land, $4.4 million for construction and $525,000 for furniture intended for 150 employees.

Cars need gas . . .

That $5.8 million, plus $5 million for the actual system, can place a mainframe in that building. But it just sits there.

"One of the first expenses that takes off is software. There are plenty of things to add on, and your vendor is always willing to help you with that," says International Data Corp. analyst Steve Josselyn.

Software adds up like options on a new car. A basic combination of IBM software products easily sports a list price of $1.6 million and would include operating systems such as MVS/XA and VM; systems software, including CICS and DB2; resource managers and performance monitors; and applications such as accounting and an integrated distribution system. And for much of that library, you'll only be buying a one-year license and maintenance; you should thus plan on add-ons for each product that will cost from a few hundred to thousands of dollars.

The mainframe remains useless without a disk drive — or, to be realistic, 30 of them. Tack on $2.6 million for 30 IBM 3380 disk drives and some controllers and $434,200 for IBM 3480 tape drives.

Tapeless tape drives are as useful as diskless computers, so add $325,000 for a starter kit of 25,000 cartridges and $1 per tape for shelving. Transporting cartridges seems cheap, since carts for the job list for $530.

The computer also needs electricity, that sometimes fickle luxury. Investing in an uninterruptible power supply can cost $10 to $12 per square foot of raised floor, while a generator would cost about the same, by one estimate.

Terminals, terminal controllers, front-end processors and host-based printers can add $500,000 to the budget. Those printers eat paper by the ton, so you might consider one estimate that running off five million pages costs $125,000 for paper and supplies.

But computers are useless without users, who need communications, which means lines and modems. Monthly access fees vary by up to 50%, depending on the type of service and location, but might run $50 for a dial line plus usage charges and $350 for a 120-mile 9.6K bit/sec. leased line.

What is on the other end of the communications lines? More modems and PCs. If the sample data center is supporting 800 users, most of whom have $4,000 IBM Personal System/2 Model 50s and a few of whom use $6,000 PS/2 Model 70s, the price tag hits $3 million.

Don't forget software

PCs need software, and the lucky manager can get it through discount channels. For example, 300 copies of Ashton-Tate Corp.'s Dbase III — list price $695 — can be had at a savings of almost $100,000. But for consistency, stick with list prices of $148,500 for 300 copies of Lotus Development Corp.'s 1-2-3, $195,000 for 100 copies of Digital Communications Associates, Inc.'s Crosstalk and $247,000 for 500 copies of Micropro International Corp.'s Wordstar.

Also remember that PCs like to talk to each other, so plan on local-area networks. One estimate for token-ring network cabling, software and cards is $1,000 per node.

All of that should get the data center and users working, but the planner also has to remember that a tornado or flood can change the rules. Therefore, it might be worth $60,000 per year for a hot-site contract in case disaster strikes and you need some way to recover data and continue operations.

Since it doesn't take a tornado to bring down a computer, maintenance must be accounted for. What might it cost for the on-site maintenance for the 3090, the PCs, the storage devices and the other hardware? Those blue-suited folks could easily cost $663,000.

Mistakes in planning can be expensive, too. Kling-Lindquist's Ralston says one mistake companies make is forgetting how data center needs will change as technology and the company change. He says one way to deal with surprises that may pop up after the data center is built is to add more raised floor than is immediately needed, even if that space houses offices temporarily.

> "PLANNING. It doesn't have to be real fancy and documented, but it has to be there."
>
> TERRY CIESLAK
> MAY & SPEH

May & Speh avoided the surprise of lost business due to downtime after the move. The firm ran a month of tests on a duplicate set of 130 leased data lines and dial-up lines to its customers. That meant an extra month of communications bills.

Modestino, who plans to move Ocean Spray's data operation into the company's new Middleboro, Mass., headquarters in November, emphasizes that little costs accumulate. "It may seem like peanuts, but we have $3,000 set aside for plumbers to come in to hook up the water connections for the equipment after it's installed."

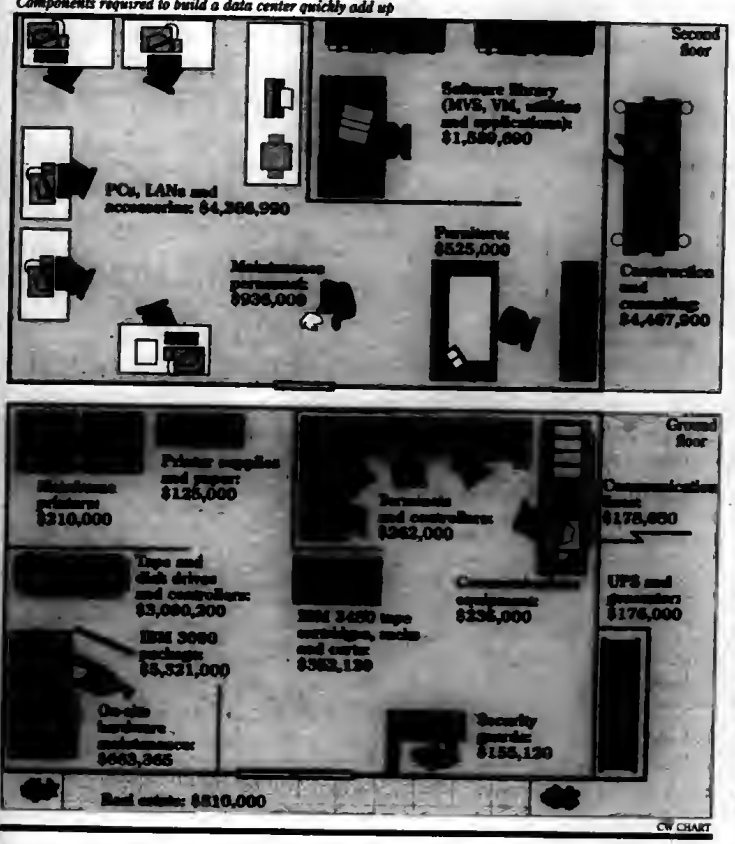
Ralston cites the common mistake of underestimating the need for security and maintenance personnel. Noting that one hour of downtime at a data center can cost a company like an airline $1 million in lost business, Ralston says many data centers have too few maintenance people, including cleaners, plumbers and electricians.

Ralston says short-term costs can mean happier long-term employees if companies provide more amenities for data center personnel than for general business employees. Those amenities might be more expensive furniture, nicer lunch rooms or day care facilities. The reasoning is that data centers are 24-hour operations and many firms discourage data center workers from leaving the building for personal errands or lunches.

"More and more attention is being paid to the aesthetic quality of the working environment. . . . Those people are becoming increasingly professional and becoming much harder to find and keep," Ralston says.

From the ground up

Components required to build a data center quickly add up



NAS line low on power?

Answer to IBM S series lags Big Blue, Amdahl machines

BY J. A. SAVAGE
CW STAFF

SANTA CLARA, Calif. — National Advanced Systems (NAS) unveiled 15 mainframe models last week in response to IBM's a S series. But the fastest model, at 88 million instructions per second (MIPS), does not approach the more than 100 MIPS of power claimed by the top models in the lineups of both IBM and Amdahl Corp.

While improving price/performance, shortening cycle time and unifying NAS' earlier AS/XL and AS/VL product lines, the AS/EX series exhibited little to differentiate the company from the competition. NAS claimed an average throughput improvement for commercial customers of 115% to 125% over earlier models.

The models run from the AS/EX 10, a uniprocessor with up to 256M bytes of memory priced at $489,197, to the four-processor AS/EX 100, which has up to 2G bytes of memory and costs $9.5 million. The AS/EX 10 is the smallest system yet to be offered by NAS, and the AS/EX 100 is 14 MIPS faster than the company's earlier high-end machine, the AS/XL 100.

"With no startling features to make consumers stand up and take notice, I don't think it will win over customers from IBM and Amdahl," said Stephen Josselyn, an analyst at Framingham, Mass.-based International Data Corp.

"I question where they will sell outside of their installed base," said analyst Bonnie Digrius at Santa Clara-based Infocorp. "NAS wants to move those with 3080 computers who have yet to upgrade, but they won't offer ESA support for at least s year, and IBM offers it now."

> "I DON'T THINK it will win over customers from IBM and Amdahl."
>
> STEPHEN JOSSELYN
> IDC

Digrius also deplored the lack of a very high-end system. If NAS had offered one to compete with Amdahl and IBM, she said, "it would at least give users a warm fuzzy sense that they can go bigger."

NAS offers an upgrade plan for its current users to move to the new series. The upgrades are actually box swaps, but s customer's investment in channels and memory devices will not be affected, according to the company.

NAS said its low-end Models 20, 25, 30 and 40 are currently available and that its Models 50 through 100 will be available early in the fourth quarter.

Remote storage

Also announced last week were a system allowing remote operations of storage subsystems and an enhancement to its diagnostic system, which predicts failures in the company's storage products.

The remote operations product, called AS/Control Facility Storage, costs $10,500 for the initial base, which controls the computer itself, and $1,000 for each additional disk control unit at the site. The AS/Control Facility was introduced in mid-June.

The diagnostic system, called NAS-track II, is artificial intelligence software on s processor board installed in NAS' 7480 tape controller. It constantly monitors and runs diagnostic routines on the storage systems and transmits information to a NAS data center. If needed, s customer service representative will be sent to the site in order to service equipment prior to any breakdown, the firm said.

Computerworld Premier 100 worksheet

In response to numerous calls for more detailed information about *The Computerworld Premier 100*, s supplement listing the most effective users of information systems published Sept. 12, here is an amended worksheet for estimating your company's score. By following the instructions below, you will be able to get a rough idea of where your company would rank. The ranking is based on six criteria that are weighted according to importance: 1 — Current Market or Book Value (weight of 15); 2 — Estimated Budget (weight of 30); 3 — Profit (weight of 15); 4 — Staff (weight of 10); 5 — Training (weight of 15); and 6 — PCs and Terminals (weight of 15).

The actual Premier 100 rankings are based on s proprietary scoring system that also considers s company's scores in relation to the figures from all the companies surveyed. Your estimated calculation will be within a few hundred points of accuracy compared with the group ranking. If you would like s more precise ranking than the estimate or would like your company to be considered in next year's ranking, send your data for the six criteria to Mike Sullivan-Trainor, Special Projects Editor, *Computerworld*, 375 Cochituate Road, Framingham, Mass. 01701.

Criterion 1. CURRENT BOOK VALUE

Current book value of major processors, excluding peripherals and PCs: _____

STEP 1 — Divide by current corporate revenues: _____

STEP 2 — Multiply by 100 to obtain a percentage: _____

STEP 3 — Assign the points associated with the range in which your percentage falls: _____

Less than 0.01 — 5 points; 0.01 to 0.47 — 30 points; 0.48 to 0.96 — 70 points; 0.97 to 1.8 — 110 points; 1.9 to 3 — 130 points; 3.1 to 4 — 140 points; 4.1 to 6 — 150 points; more than 6 — 160 points.

STEP 4 — Multiply by a weight of 15: _____

This is your total score for Current Book Value.

Criterion 2. ESTIMATED BUDGET

Estimated annual MIS/DP budget for corporation: _____

STEP 1 — Divide by current revenues: _____

STEP 2 — Multiply by 100 to obtain a percentage: _____

STEP 2 — Find your company's industry below and subtract the industry average percentage from your percentage: _____

Aerospace — 1.4; Chemical — 1.2; Consumer products — 1.5; Electronics — 1.4; Food and beverage — 0.8; Health and pharmaceutical — 1.2; Industrial and auto manufacture — 1.0; Metal and metal products — 1.2; Petroleum and petrochemical — 0.68; Other process industries — 0.68; Banking — 4.5; Life insurance — 1.7; Other insurance and financial services — 3.1; Retail — 1.0; Transportation — 4.5; Utilities — 1.3.

STEP 4 — Assign the points associated with the range in which your answer falls: _____

Less than -4 — 5 points; -4 to -1 — 20 points; -0.99 to -0.05 — 50 points; -0.04 to +0.25 — 80 points; 0.26 to 0.63 — 100 points; 0.64 to 2.1 — 120 points; 2.2 to 2.8 — 130 points; 2.9 to 4 — 140 points; more than 4 — 150 points.

STEP 5 — Multiply by a weight of 30: _____

This is your total score for Estimated Budget.

Criterion 3. PROFIT

STEP 1 — Calculate the percentage that represents your corporation's average profit growth over five years (1983 to 1987): _____

If you show negative profits any year, mark zero in this category.

STEP 2 — Assign the points associated with the range in which your percentage falls: _____

Less than -4 — 5 points; -4 to -2 — 20 points; -1.9 to +0.05 — 50 points; 0.06 to 0.60 — 80 points; 0.61 to 2 — 100 points; 2.1 to 2.85 — 110 points; 2.86 to 6 — 120 points; 6.1 to 10 — 130 points; 10.1 to 20 — 140 points; more than 20 — 150 points.

STEP 3 — Multiply by a weight of 15: _____

This is your total score for Profit.

Criterion 4. STAFF

STEP 1 — Calculate the percentage of your current MIS/DP budget spent on staff: _____

STEP 2 — Assign the points associated with the range in which your percentage falls (round to the nearest whole number):

Less than 20 — 150 points; 21 to 30 — 140 points; 31 to 40 — 130 points; 41 to 50 — 120 points; 51 to 60 — 110 points; more than 60 — 100 points.

STEP 2 — Multiply by a weight of 10: _____

This is your total score for Staff.

Criterion 5. TRAINING

STEP 1 — Calculate the percentage of your current MIS/DP budget spent on training and education: _____

STEP 2 — Assign the points associated with the range in which your percentage falls: _____

Less than 1 — 50 points; 1 to 1.5 — 100 points; 1.6 to 1.9 — 120 points; 2 to 2.9 — 140 points; 3 to 5 — 150 points; more than 5 — 160 points.

STEP 2 — Multiply by a weight of 15: _____

This is your total score for Training.

Criterion 6. PCs AND TERMINALS

Total number of personal computers and terminals: _____

STEP 1 — Divide by the total number of corporate employees: _____

STEP 2 — Multiply by 100 to obtain a percentage: _____

STEP 2 — Assign the points associated with the range in which your percentage falls (round to nearest whole number): _____

Less than 1 — 5 points; 1 to 6 — 20 points; 7 to 8 — 30 points; 9 to 11 — 50 points; 12 to 14 — 70 points; 15 to 17 — 90 points; 18 to 19 — 100 points; 20 to 25 — 120 points; 26 to 28 — 130 points; 29 to 31 — 140 points; 32 to 33 — 150 points; 34 to 40 — 160 points; 41 to 50 — 180 points; 51 to 63 — 190 points; 64 to 75 — 200 points; more than 75 — 210 points.

STEP 4 — Multiply by a weight of 15: _____

This is your total score for PCs and Terminals.

FINAL SCORE

ADD POINT TOTALS FROM Book Value, Estimated Budget, Profit, Staff, Training and PCs and Terminals: _____

This is your estimated Premier 100 score.

Amdahl to add support for MVS/ESA in '89

Amdahl Corp. last week became the first of the IBM plug-compatible mainframe makers to announce a date for offering support for IBM's MVS/ESA operating system. Amdahl said it plans to offer MVS/ESA at no cost to its customers by the fourth quarter of 1989.

The operating system, which is said to increase throughput, was delivered to Amdahl in June. It is taking longer to accommodate to Amdahl machines than was expected in February, when a company spokesman said it would be available within a year of first delivery to the company. One reason may be that MVS/ESA affects more boards than Amdahl's engineers expected.

CORRECTION

IBM's market share for 1987 workstation shipments is 3.1% [CW, Sept. 5].

Bending to demand, IBM revives AT bus

BY JAMES DALY
CW STAFF

NEW YORK — IBM blinked.

Seventeen months after staring down customers with its assurance that they would no longer need its Personal Computer AT bus architecture, IBM bent under the wind of consumer pressure last week and released an entry-level Personal System/2 machine based on the abandoned bus.

The debut of the Model 30 286 at the firm's midtown headquarters smoothes two creases in IBM's armor. It not only assuages users who were hesitant to switch their software to the Micro Channel bus found in high-end PS/2s but also rains on the parade of the Extended Industry Standard Architecture committee, a cartel of nine competitors that was across town announcing plans to create a new bus standard based on a 32-bit AT-style architecture (see story page 1).

IBM further shored up its embattled PS/2 defenses by unveiling software that reportedly lets Micro Channel-based PS/2s run programs written for its System/36 mid-range processor.

Fills the void

The Intel Corp. 80286-based Model 30 286 fits between IBM's two best-selling PS/2 models — the Models 30 and 50 — and fills the void left in IBM's product line when it discontinued the AT in April 1987 and launched the PS/2 family.

Although sales of competitors' AT-style bus machines continue to rise, IBM denies any misstep. "If we could have put a Micro Channel Architecture on the Model 30 286 at the same price, we certainly would have," IBM Vice-President of Software Marketing Bill Lyons said.

The Model 30 286 is targeted at users who have no burning desire to abandon their current DOS environment but want to have the processing power to step up to OS/2 if the need develops, Lyons said.

The introduction is seen as an important concession to users who were either nervous to embrace an unknown architecture or unwilling to move. "IBM made a very critical mistake in judging how users would warm up to the Micro Channel," said David Wu, a technology analyst

IBM's Lyons

at S. G. Warburg & Co.

The Model 30 286, which externally is almost identical to the Model 30, is made in Raleigh, N.C., and comes in two versions: the Model 30 286-E21, which has a 20M-byte fixed disk drive and costs $2,595; and the Model 30 286-E01, which comes without a fixed disk drive and sells for $1,995.

The Model 30 286-E21 is available directly through IBM; the Model 30 286-E01 is available only through IBM Business Partners.

But the advantages of the Model 30 286 over the original Model 30 — up to 25 times more memory, twice the processing speed, the advanced Video Graphics Array and a cost of only $200 more — may also cast a shadow on the future of the earlier model. "It will certainly put the squeeze on the old Model 30 because it's a lot more machine for the money," said P. Martin Ressinger, vice-president of the Duff & Phelps, Inc. research firm in Chicago.

You say MCA; I say EISA

Although few vendors offer clones of the IBM Micro Channel Architecture (MCA), this did not stop a group called EISA from borrowing concepts liberally from the still-controversial IBM bus architecture. In fact, EISA will provide nearly exactly the same features that make the Micro Channel more technically proficient, at least in theory, than the old IBM Personal Computer AT bus.

Like MCA, EISA will have 32-bit support for addressing memory and moving data and will support so-called multiple bus masters that allow separate processors to utilize I/O functions simultaneously along with other, similar functions.

One big difference is that IBM's bus is available today, and the alternative is not. But the most important difference for EISA supporters is that EISA will maintain compatibility with the AT bus architecture, while MCA does not.

The EISA announcement touched off an arcane — but nonetheless virulent — argument over which will ultimately be the superior bus. For Compaq Computer Corp. Chairman Rod Canion, who has been an apparent leading force in the EISA alliance, the MCA's lack of backwards compatibility, along with what he considers sluggish performance in some areas, leaves room for a better bus.

But IBM said EISA proponents are comparing apples with oranges. Canion compared the EISA bus as it should look in late 1989 with the MCA as it was introduced in April 1987 and is implemented today. "We have a product; they have a set of charts," IBM spokesperson Scott Brooks argued.

Retaliation

While the EISA group plugs away at its system, IBM will aggressively enhance the MCA, proclaimed Robert Carberry, vice-president of systems at IBM's Entry Systems Division.

Carberry said that the MCA, even as it is implemented today, is superior to the proposed EISA standard. Where EISA will top out at 33M bytes as its data transfer rate, the MCA's starting point is 32M bytes, and it has the potential of rising to between 40M and 80M bytes, Carberry argued. The MCA also uses a data transfer technology that is able to match systems memory to the speed of I/O subsystems.

Canion was not willing to concede any points. "You are talking about the possibility vs. reality," Canion said. Canion argued that since the MCA bus has yet to be exploited, it cannot be called superior.

Carberry disagreed, saying that products are either here or are on the way that exploit the MCA's multiple bus masters feature. As an example, Carberry mentioned the Micro Master 386, a processor enhancement card for the IBM Personal System/2 Model 50, from AOX, Inc. in Waltham, Mass., which acts as a bus master.

DOUGLAS BARNEY

Cloners

FROM PAGE 1

add-in boards to the brew (see story this page). Compatibility is something the Micro Channel has failed to achieve and has prompted some users to drop IBM from approved purchase lists. By the same token, EISA will not be compatible with the nearly 400 MCA boards on the market today.

Most wars are fought with somewhat similar weapons, and tactics and resolve determine the outcome. But for at least the next year, the opposition group will fight IBM fire with arguments only. Products based on the proposed standard are not set to ship until late next year at the earliest, but members of the alliance said it will take at least that long for vendors and users to exploit EISA's capabilities.

"Defining this bus now will let software vendors and systems vendors define the systems we will be using one or two years from now," said Robert L. Puette, general manager of the personal computer group at Hewlett-Packard Co.

EISA members expressed confidence that IBM will continue to lose market share by pushing an incompatible architecture. But most users who have held off on IBM Personal System/2s have been waiting for its advanced features to be exploited before making decisions. If the MCA's capabilities are tapped, such PS/2 sales reluctance could turn around.

PHOTOGRAPH BY JOHN GIORDANO/PICTURE GROUP

Wong, Canion: *Have they built a better bus?*

While the sheer weight of the opposition had IBM on the defensive, the similarities with the Micro Channel had some IBM officials cackling. "IBM has it now," joked Robert Carberry, vice-president of systems at IBM's Entry Systems Division.

In an industry already suffering from mixed signals, stalled products and overall confusion, EISA added yet another layer of uncertainty.

Some users are concerned that the effort may fail due to infighting, and some wondered who would buy the AT bus machines when it is clear that EISA will make them obsolete. Since EISA features will not be exploited for a while and are aimed at specific applications, sales of older bus machines should not be affected, members said.

Although the bus announcement was described as user-driven, users contacted last week showed far less excitement than the EISA vendors.

For some, EISA is too little, too late. "This should have been solved years ago," lamented Albert Collins, vice-president of information services at HBO & Co. in New York.

A 32-bit extension to the AT bus was proposed by Phoenix Technologies, Inc. in 1986, before the Micro Channel was even announced. The effort fell apart because of political infighting and Compaq's refusal to join, Phoenix officials said.

Rod Benton, the Alabama State Government's director of data systems, said he was pleased that there will be an alternative to IBM for 32-bit bus systems, which should keep prices reasonable.

But given the choice, Benton said he would prefer that EISA vendors simply "clone the MCA and get it over with," he said.

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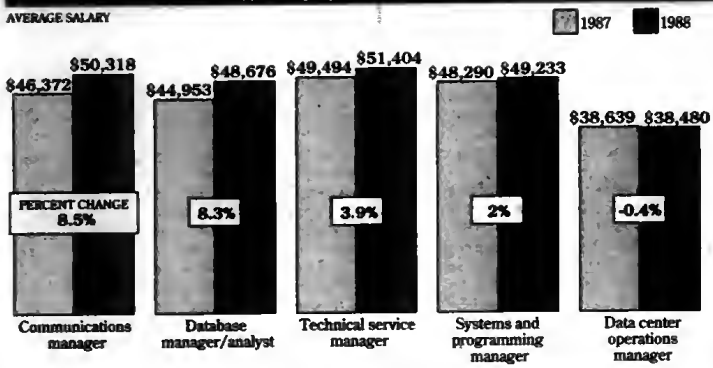
TRENDS

MIS salaries

Almost all DP managers' pay levels have increased



Average salaries for programmers reported in the 1988 *Computerworld*/Data Processing Management Association salary survey are down from the levels in last year's survey. Recruiters attribute this to corporate belt-tightening and a maturing of the DP field.

Officials of two leading DP recruiting firms say they have observed the same pattern.

"I firmly believe that there has been a very strong trend in corporate America to hire at lower salaries — because DP salaries have been so strong — to try to slow down that rampant salary growth," says Blake Lewis, a Northern California regional manager at Source EDP.

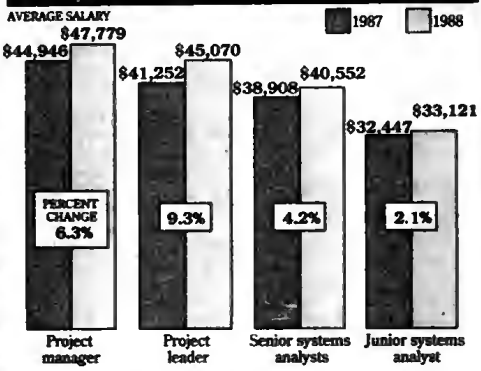
Mark Silbert, vice-president of Half International, Inc. in New York, attributes the development to tighter control of MIS organizations. "We're seeing an industry that is maturing, because the people driving it are becoming more savvy, more well-rounded," he says.

The average salary reported for operations managers is also lower than last year's, which Lewis attributes to increasingly sophisticated host processors and systems software. This means data centers can be run with fewer people.

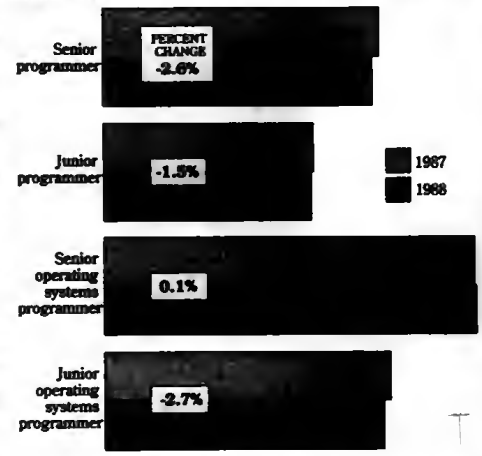
Average salaries have risen solidly from last year for database and communications managers as well as for project managers and leaders. Recruiters say companies are assigning communications and database managers broader responsibilities and that tighter budgets notwithstanding, they are paying premiums to retain their key technical people, project managers and project leaders.

DAVID A. LUDLUM

Analysts saw slowest gain . . .



. . . and programmers got no boost at all



SOURCE: A *COMPUTERWORLD*/DATA PROCESSING MANAGEMENT ASSOCIATION 1988 SALARY SURVEY
CW CHARTS

INSIDE LINES

IBM Held Hostage — Week 3. Rumors continue to fly about a new manager being on the way to save IBM's flagging fortunes in the PC biz and to give Entry Systems Division chief Bill Lowe a new boss to help beat back competitors. According to *The Wall Street Journal*, IBM will dispatch Richard T. Gerstner, currently vice-president of IBM's Asia/Pacific group, to head up IBM's PC efforts. Gerstner, the Journal said, will be replaced by Ed Lucente; one analyst predicted that move earlier in the month. "There is no question IBM is shuttling people around, and it surprises no one that they are disappointed with market share lost," said an unamused Thomas T. Rooney, an analyst at DLJ Securities. "But it is not nearly as important as many think." As expected, IBM had little to say. "We don't comment on press speculation," spokesman Ed Stoby said.

Next: The *real* computer for the rest of us. Exiled Apple cofounder Steve Jobs' long-awaited workstation (it's a year later than predictions said) will make its bow Oct. 12. The Next, Inc. workstation is widely speculated to be a Motorola 68030-based unit running Unix and boasting state-of-the-art graphics capabilities. The introduction will be typical Jobs style — the Louise M. Davies Symphony Hall in San Francisco has been rented.

Couldn't book Cannes? Data General has scheduled what it is calling one of the most important announcements in its history for Monday, Oct. 3 in New York. It has been predicted that the company will be responding to DEC's 8800 line, which was unveiled in March.

SNA to groove to the PC beat. IBM is still tinkering with its 14-year-old hierarchical SNA. A source tells us IBM is laboring over a new SNA capability — LU6.4 — that reportedly will provide some level of capacity for peer-to-peer networking while also eliminating some of SNA's massive overhead and allowing some SNA facilities to be processed at the small-system level. But host systems will retain control of such functions as network management diagnostics and sign-ons, a source says. LU6.4 is clearly in the future, but it will enable SNA to be more than hierarchical, the source adds.

Everything but the kitchen sink, we think. Among the kinds of products some analysts are expecting from IBM, and which we may see tomorrow at the second IBM product rollout in as many weeks, are the following: A follow-on to the IBM 3720 front-end processor; a Netview enhancement to the AS/400, enabling it to be used as a host in a Netview environment; 16M-bit/sec. Token-Ring; and some third-party Netview enhancement software.

Finally, acquired love. Last week's Computer Associates-Applied Data Research pair-up was no shotgun marriage; CA coveted the database firm even before Ameritech did, according to Drexel Burnham Lambert software analyst Terry Quinn. ADR wanted nothing to do with CA in 1986, Quinn said, so it was seeking this kind of hands-off management with deep pockets that Ameritech provided. But when Ameritech found tough sledding in the software business, it approached five potential ADR buyers — including CA, which pounced quickly. "CA's been lusting after ADR for years," Quinn said. He noted that ADR programmer products like Librarian and Recoup fill major holes in CA's line of tools.

Every week we get our ass
To help on a bus that won't be Blue
It's so many we just sit and chew
Their product wait is only a year

Thank you Compaq for bringin' us here
You other clones have no fear
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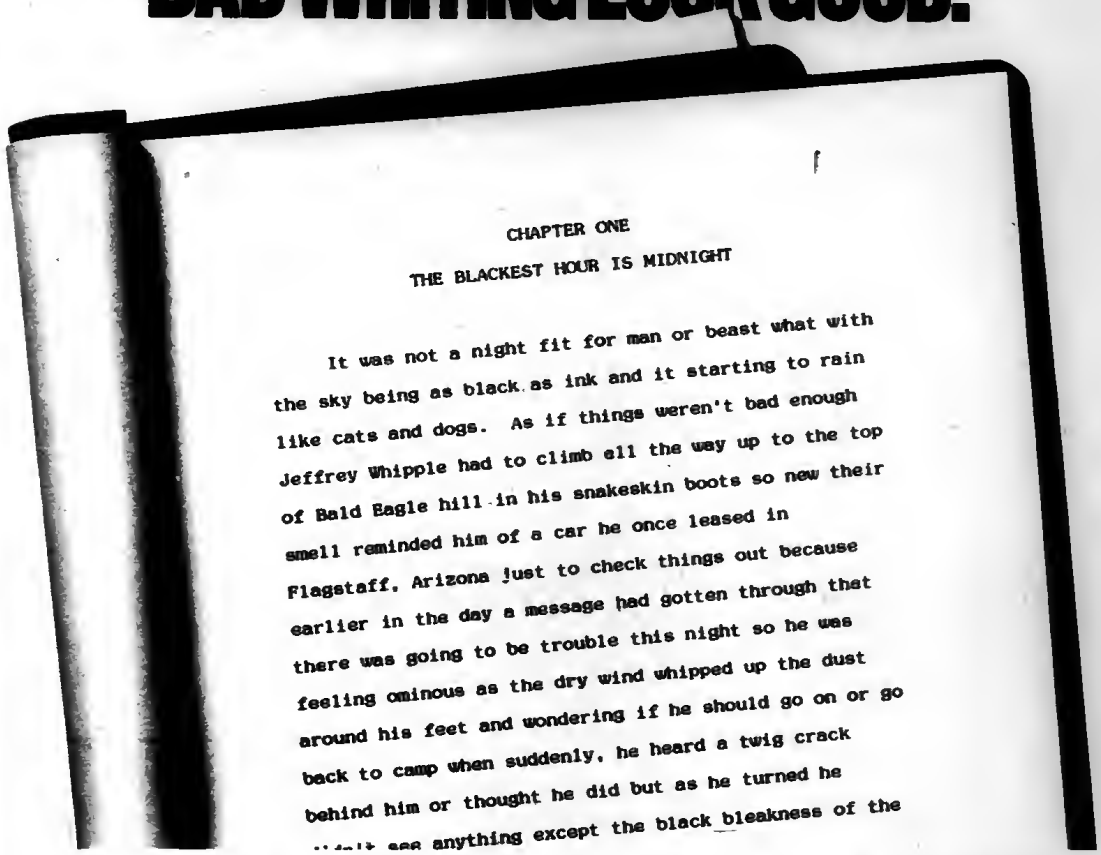

CHAPTER ONE

THE BLACKEST HOUR IS MIDNIGHT

It was not a night fit for man or beast what with the sky being as black as ink and it starting to rain like cats and dogs. As if things weren't bad enough Jeffrey Whipple had to climb all the way up to the top of Bald Eagle hill in his snakeskin boots so new their smell reminded him of a car he once leased in Flagstaff, Arizona just to check things out because earlier in the day a message had gotten through that there was going to be trouble this night so he was feeling ominous as the dry wind whipped up the dust around his feet and wondering if he should go on or go back to camp when suddenly, he heard a twig crack behind him or thought he did but as he turned he [illegible] anything except the black bleakness of the

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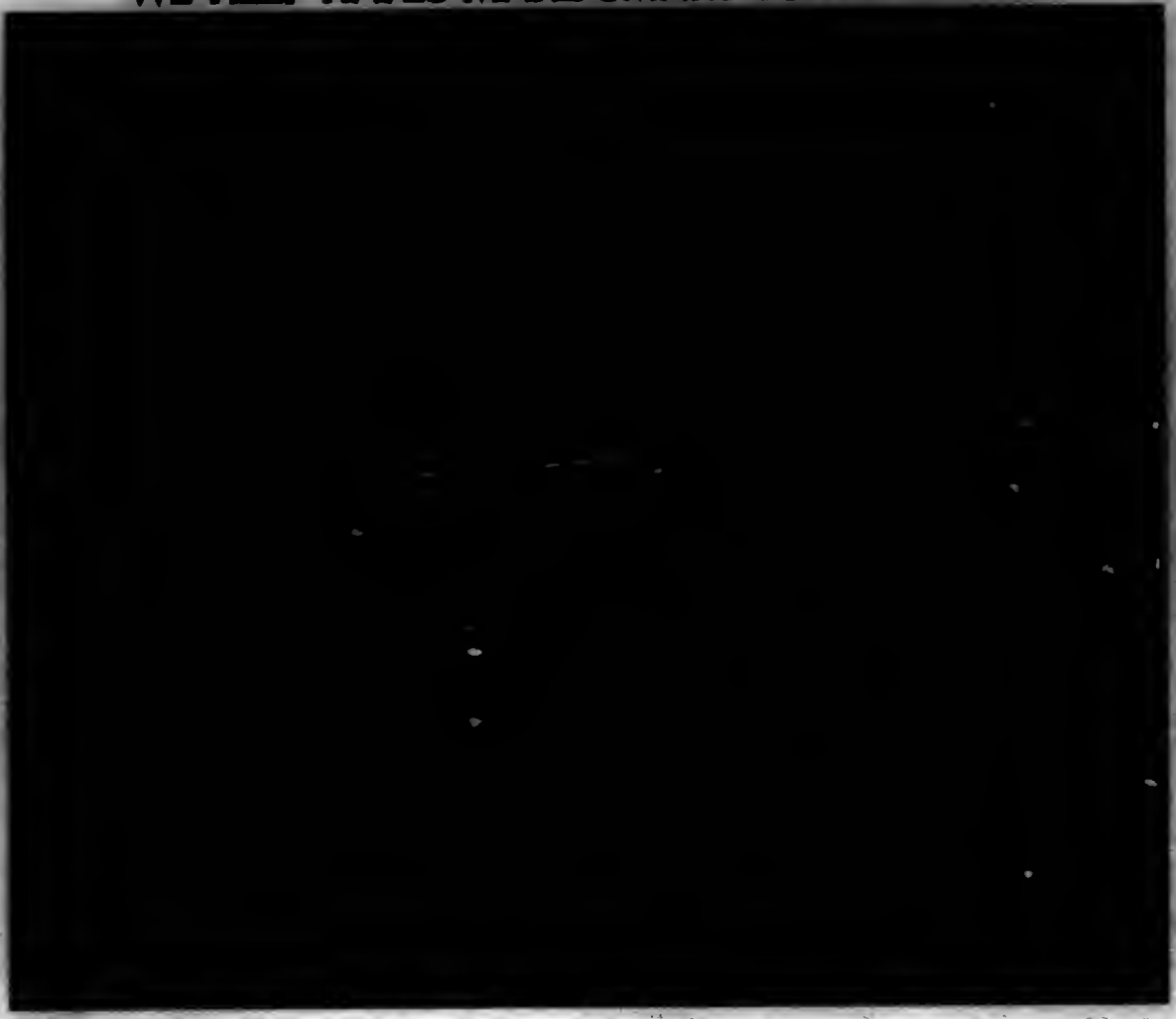

Hayes Microcomputer Products, Inc., is one of the premier successes in the electronics world. Hayes pioneered the personal computer modem a decade ago and still continues as the industry leader.

The company's rapid growth, however, has brought about its own set of growth needs. To help manage its expanding business Hayes needed flexible applications software. So they selected systems from Management Science America, Inc.

"The foremost reason we selected MSA was that the company is stable, with software on the market that offers tried and true solutions," comments Ken Voelker, Director of Hayes Information Management Group.

MSA's Manufacturing System provides Hayes the solution they wanted for integrating information in three key areas. Inventory Control has enabled Hayes to reduce warehousing, insurance and carrying costs, and free up capital for non-inventory investments. Material Requirements Planning saves Hayes significant time and money by generating requisitions automatically and sending them directly to Purchasing, providing buyers with more lead time to negotiate. And, because the Order Processing System has visibility into both inventory and manufacturing schedules, Hayes can take customer orders and make timely delivery.

Hayes views its relationship with MSA as a long term partnership. Adds Voelker, "We use MSA's Financial and Human Resource Systems as well as the Manufacturing System. We have an ongoing commitment from MSA and are confident we can depend on them for additional systems to meet our needs."

Connecting with MSA Software was a smart move for Hayes. It can be for your company too. Call Robert Carpenter at (404) 239-2000.

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